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JANUARY 1981

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1981 outlook
1980 review

PIT & QUARRY

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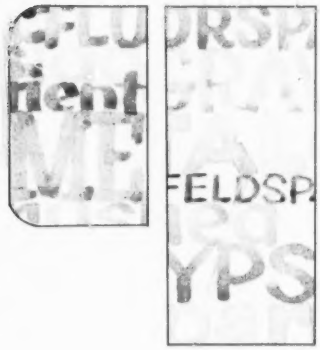

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Cementos Catatumbo, onstream in Venezuela in mid-1980, features an 1,800-mtpd reinforced suspension preheater kiln equipped with a precalciner. (See page 94.)

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1981 outlook
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CEMENT
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Pit and quarry industries—

Brakes expected in 1981 on 1980 slide

BY SANDY HEROD

Depending on the scale on which charts of economic factors covering the past year could be drawn, up-and-down trends could look like the Alps or reflect a more moderate program of upturns and downswings. The net effect would be the same. Over the course of the year, these industries, basic to the nation's physical growth, collectively experienced a decline variously estimated between 8 and 12%.

This, despite the fact that respondents to our latest annual surveys report, on average, lesser rates of decrease. It also is interesting to note that optimism for 1981 is even more prevalent than it was a year ago.

Information is sought from a variety of sources to develop this annual Outlook and Review. In addition to personal contacts by our staff with a large segment of the portland cement industry, several thousand firms in the aggregate industries are canvassed by questionnaire. The data are complemented by commentaries solicited from staff leaders of national, regional, and state associations.

The initial section of this report presents comments submitted by staff heads of major national industry groups with interests common to those of the majority of our readers.

Their comments are followed, in the next two sections, with reviews by our staff of factors in the construction field and of current conditions, along with long-range plans, in the domestic portland cement industry. (An international cement review is presented elsewhere in this issue. See pg. 109)

The fourth section incorporates observations by several state and regional association staff leaders which review conditions in the aggregates industries in specific geographic areas.

In the final section of this report, we present the conclusions and analyses drawn from our questionnaire survey of several thousand producers in three major aggregate industries. This is followed by summaries of the latest government and private industry data available on major nonmetallic commodities including lime, agricultural limestone, gypsum, phosphate, potash, and others.

The cooperation of the well-known leaders of national and state industry organizations who again have been responsive to our request for their participation is sincerely appreciated.

At the national level, we are indebted to Richard E. Reuss, president, Portland Cement Association; William L. Carter, president, National Crushed Stone Association; Robert Koch, president, National Limestone Institute, Inc.; Howard Eggleston, managing director, National Slag Association; T. R. Berger, executive director, Lightweight Aggregate Producers Association; Harry C. Robinson, managing director, Expanded Shale Clay and Slate Institute; Kenneth Gutschick, vice president and technical director, National Lime Association; and A. Victor Abnee Jr., executive vice president, Gypsum Association.

The following state association staff leaders furnished commentaries on industry conditions in their specific areas: J. R. Hitchcock, executive director (ret), Georgia Crushed Stone Association; R. E. Eichelberger, executive secretary, Nebraska Sand, Gravel & Ready Mixed Concrete Association; George Dirkes, executive director, Illinois Association of Aggregate Producers; N. A. McDonald, executive manager, Missouri Limestone Producers Association; Don Reining, executive secretary, Southern California Rock Products Association; and Jack Cedarblade, executive secretary, Aggregates and Concrete Association of Northern California, Inc.

. . . New 550,000 tpy dry process plant placed onstream in 1980 by Texas Industries at Hunter, Texas uses a Polysius preheater/precalciner kiln arrangement. *(Courtesy: Polysius Corp.)*

Portland cement Production and project survey

BY SID LEVINE

Cement use in the United States will grow to an average of 85 million short tons per year in the next 5 years, compared with an annual consumption of 78 million tons in the 1970s, according to recent forecasts by the Portland Cement Association. To attain this goal, however, a sharp rise in shipments would be needed starting in 1983. In its October 1980 forecast, PCA's estimates of cement consumption were 73.4 million tons in 1980 and 76.4 million tons for 1981, compared to 83.3 million tons in 1979.

The projection is based primarily on estimates of housing activity. In the forecast on U.S. cement consumption, PCA economist Robert Roy points out that cement consumption is affected both directly by residential construction and indirectly by housing's effect on other cement-using construction markets. For this reason, Roy notes, an excellent model of cement demand can be constructed with home building as the leading variable. In addition, he said, long-term projections of housing activity are available from several economic forecasters.

Cement production

During 1979, 83.4 million tons of portland cement were shipped from plants in the United States and Puerto Rico, according to the U.S. Bureau of Mines. Shipments were slightly higher than in 1978 and 4% less than the 1973 record levels of 86.6 million tons. Mill value rose to $3.9 billion, 13% higher than in 1978; this increase reflects an average unit price hike of $5.53 per ton.

At 1979 year-end, 377 kilns at 157 plants were operated by 50 companies and one state agency in 40 states and Puerto Rico. Ten producers provided 46% of the total clinker production capacity; in descending order, they are: Ideal Basic Industries, Inc.; Lone Star Industries, Inc.; Martin Marietta Cement; General Portland, Inc.; Kaiser Cement Corp.; Amcord, Inc.; National Gypsum Co.; Marquette Cement Co.; Medusa Cement Co.; and Southwestern Portland Cement Co.

In a slightly different descending order, nine of the 10, plus one other, produced 45% of the finished cement ground in this country. The companies are: Lone Star Industries, Inc.; Ideal Basic Industries, Inc.; Martin Marietta Cement; General Portland, Inc.; Amcord, Inc.; Kaiser Cement Corp.; Medusa Cement Co.; National Gypsum Co.; Marquette Co.; California Portland Cement Co.

Portland cement shipments in 1979, by type of customer, were: ready-mixed concrete, 65.9%; concrete product manufacturers, 14.1%; building material dealers, 8.9%; highway contractors, 4.5%; other contractors, 4.7%; federal, state, and other government agencies, .7%; miscellaneous, including own use, 1.2%.

Shipments of masonry cement were 3.8 million tons, a decrease of 9% from 1978. The top five masonry producers in descending order were: Louisville Cement Co.; Martin Marietta Cement; General Portland, Inc.; Marquette Co.; and Medusa Cement Co. These companies produced 44% of the nation's total.

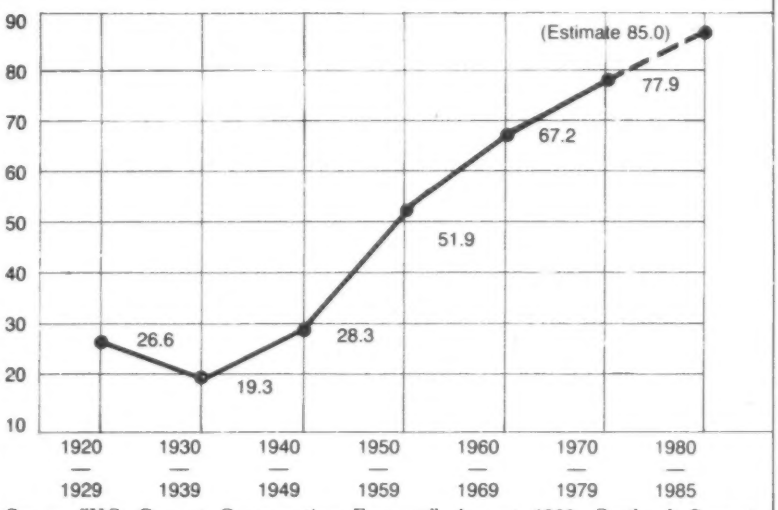
Imports

Imports of cement and cement clinker for consumption in the United States reached a record 9.4 million short tons in 1979, 42% above the 1978 total of 6.6 million tons and 40% above the 1973 record of 6.7 million tons. The imports constituted 11.3% of the year's finished cement shipments. Most of the supplying countries increased their exports to the United States possibly because of a drop-off in cement use abroad. Preliminary data indicate

FIG. 1

U.S. Cement Consumption—annual average tonnage for 10-year periods (1920-1979) and estimate for 1980-1985

million short tons

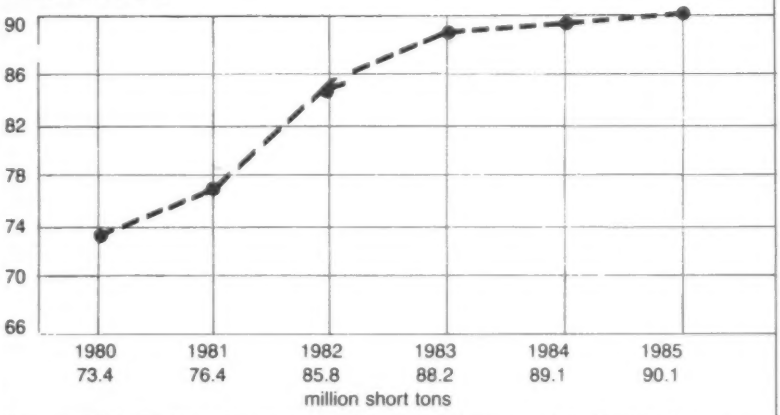


Source: "U.S. Cement Consumption Forecast," August 1980, Portland Cement Association

FIG. 2

Cement Consumption Forecasts, 1980-1985 (average values, based on housing forecasts)

million short tons



Source: "U.S. Cement Consumption Forecast," August 1980, Portland Cement Association (does not include Puerto Rico).

that imports into the United States may drop 50% in 1980 over 1979.

Major supplying countries were Canada, Japan, Mexico, the Bahamas, the United Kingdom, France, Spain, Norway, and Peru. For the 1973-77 period, imports were made up of the following groups: Roman (natural), portland and other hydraulic cement, 64.1%; hydraulic cement clinker, 35.3%; white nonstaining portland cement, .6%.

As usual, U.S. cement exports were quite small, amounting to 160,000 short tons in 1979. Shipments were made to nearby locations—Canada, Mexico, and the Caribbean.

To meet anticipated demand for imported cement and cement clinker in the Pacific Southwest and the Sun Belt, two new bulk cement receiving and storage terminals are expected to be operational by the end of 1981. A $17 million, 50,000-ton capacity terminal is slated for operation in California's Long Beach Harbor by mid-year.

The terminal will be operated by the Pacific Coast Cement Corp., a joint project of Philipp Brothers, a division of Engelhard Minerals & Chemicals Corp.; Northsouth Export Corp., an affiliate of Exportadora Espanola de Cementos Portland; and Lawrence J. Ramer, Pacific's chairman of the board, and John W. Sweetland, the company's president.

The facility will consist of six 165-ft.-high silos equipped with dust collection equipment. Cement brought in by ships will be unloaded with a mechanical bulk unloader made by Siwertell, A.B. of Sweden. Conveyors and a vertical lift elevator will discharge the cement into the silos.

The two-acre facility will be located on Pier D, Berth 32. Peter Kiewit Sons' Co. was awarded the contract for project construction. Cement will be distributed by 25-ton tank trailers to markets in California, Nevada, and western Arizona.

A bulk cement loading and storage facility, estimated to cost $15 million, is planned for Galveston, Tex. at Pelican Island. Texas Portland Cement Co., a subsidiary of Philipp Brothers, and Marquette Cement Co., subsidiary of Gulf & Western Industries, Inc., will operate the terminal. Cement will be brought to Galveston in barges and ships for shipment inland or for transshipment to foreign customers.

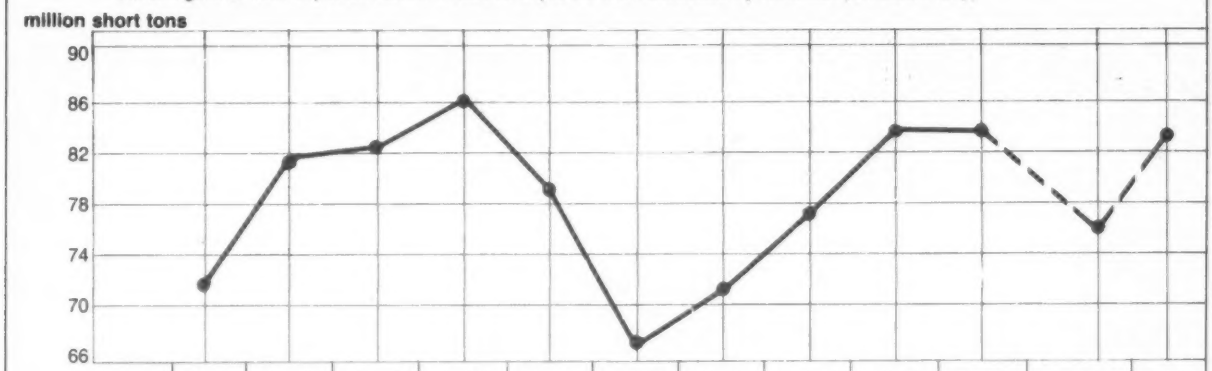
Values and prices

The value of finished portland cement shipments totaled $3.86 billion in 1979, compared with $3.41 billion in 1978. Although domestic cement consumption is expected to show a drop of 8-10% in 1980, the value may rise about 5%, to $4.1 billion, because of price increases. Average values for a ton of portland cement have risen from $31.09 in 1975 to $46.24 in 1979. Prices for November 1980, as reported in *Engineering News-Record*, ranged from $48.31 a ton in Philadelphia to $71 in San Francisco.

The value of masonry cement in 1979 amounted to $205.43 million; average value was $54.59 per short ton. October 1980 prices of cement mortar (in 70-lb. bags), as noted in *Engineering News-Record*, ranged from $2.36 in Philadelphia to $4.95 in New York.

FIG. 3 **Portland (Finished) Cement—Shipments from Mills in the United States***

(Shipments from mills (plants) = cement ground from clinker manufactured in kilns in the U.S. and Puerto Rico + cement ground from imported clinker + cement imported and distributed by domestic producers only)

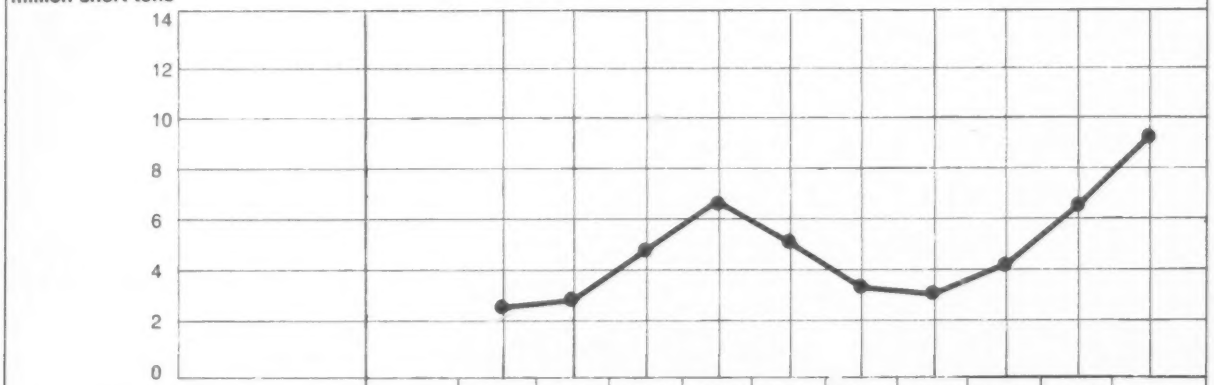


	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
	73.407	79.005	81.432	86.597	79.482	67.776	71.922	77.852	83.849	83.390	est.76.5	83.4
Clinker production in the U.S. (mst)	73.990	75.231	77.378	78.212	77.978	64.539	68.579	71.987	75.455	76.143		
Masonry cement shipped by U.S. producers* (mst)	2.978	3.392	3.850	4.130	3.432	2.908	3.304	3.764	4.102	3.833		
Stocks at mills, as of Dec. 31 (mst)	7.228	6.114	6.709	5.230	7.156	6.575	6.790	5.709	5.012	6.216	Portland cement	
	N.A.	N.A.	N.A.	.327	.354	.398	.395	.365	.339	.421	Masonry cement	

**Includes Puerto Rico. Cement shipments from Puerto Rico amounted to 1.442 million short tons in 1978 and 1.406 million short tons in 1979.*

Sources: U.S. Bureau of Mines; Pit & Quarry estimates.

FIG. 4 **Cement and cement clinker—imports for consumption (in million short tons and as percent of total finished cement shipments from mills)**



		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
	mst	2.597	3.088	4.911	6.686	5.732	3.702	3.107	4.038	6.597	9.413
	percent	3.54	3.91	6.03	7.56	7.21	5.46	4.32	5.10	7.87	11.30
Cement ground from imported clinker	mst	N.A.	N.A.	1.576	2.673	1.904	1.240	1.024	1.483	3.036	4.171
Imported cement distributed by domestic producers	mst	N.A.	N.A.	N.A.	1.619	1.617	.980	1.201	.969	2.398	3.006
Imported cement distributed by other importers	mst	N.A.	N.A.	N.A.	1.862	1.643	1.302	0.911	0.880	0.989	1.470
U.S. exports of hydraulic cement	mst	.159	.110	.101	.325	.250	.365	.250	.122	.065	.160

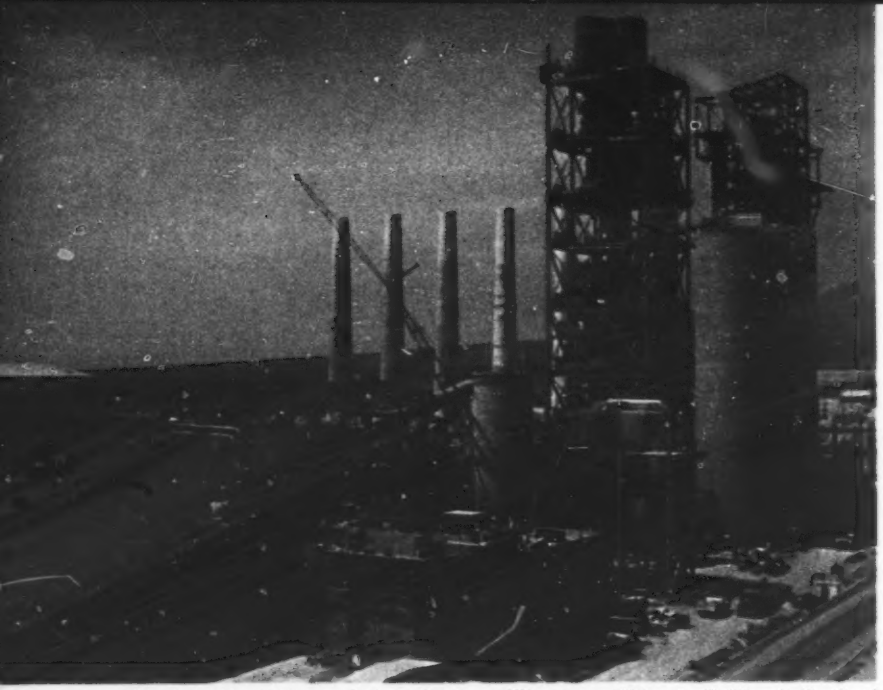
Source: U.S. Bureau of Mines

Construction

Construction contracts in 1981 will total $176 billion, 25% more than 1980's anticipated level of $140.4 billion, according to George A. Christie, chief economist for McGraw-Hill Information Systems Co. In his annual forecast issued last October, Christie estimated that the 1981 housing starts will total 1.65 million units. The mix predicted is 1.1 million single units, 180,000 condominiums, and 370,000 apartment units.

Christie expects nonresidential building contracts to total $50.6 billion next year, a 3% gain over this year's estimated $48.9 billion. Residential construction will come to $86 billion, a 44% jump over this year's $59.9 billion. Nonbuilding construction, expected to total $31.6 billion this year, will increase 25% to $39.4 billion.

Total new construction put in



. . . Scheduled for 1981 completion, the one million tpy addition to California Portland Cement's Mojave, Calif. plant incorporates a Fuller precalciner/preheater/flash furnace system. *(Courtesy: Kaiser Engineers, Inc.)*

place in the United States in 1979 amounted to $228.95 billion in current dollars, equivalent to a calculated $114.70 billion in constant 1972 dollars. A recent Commerce Department estimate gives a value of $228.3 billion for 1980 and $270.3 billion for 1981 total construction.

Regional analysis

Cement consumption and production shifted geographically in the 1970s from east to west and from north to south, PCA's economist Robert Roy points out in his forecast on U.S. cement consumption. This trend is expected to continue in the 1980s, and regional cement consumption figures will reflect this geographic move. For instance, cement use in PCA's South Central region is forecast to increase from 20.6% of total U.S. consumption in 1979 to 21.2% in 1985, a gain of 510,000 tons per year above the growth rate expected for the entire United States. The Rocky Mountain-Northwest, the Pacific Southwest, and the Southeastern regions are projected to show similar growth relative to total U.S. consumption in the next 6 years.

Individual state cement consumption should follow regional tendencies with few exceptions, Roy predicts. Cement use in any state that is a net energy producer should gain more than in net energy-consuming states. Also, cement consumption in states that encourage industrial development, such as Texas and Florida, will grow faster on the average than in states that do not, such as Oregon and California.

Antitrust litigation

Gifford-Hill & Co., Inc. and several other cement manufacturers have agreed to settle claims in a class action antitrust suit instituted against a number of cement and concrete producers. Gifford-Hill announced in August 1980 that it had reached an agreement to settle all claims in the cement and concrete antitrust litigation pending in the United States District Court for the District of Arizona. The agreement was reached in behalf of Gifford-Hill & Co., Inc. and its subsidiaries, Amcord, Inc. and Gifford-Hill Portland Cement Co., and is subject to approval of the court.

This class action litigation, initiated in 1976, contained two counts: one against the Portland Cement Association and 48 cement manufacturers, including Gifford-Hill and Amcord; and one against 15 ready-mix, grout and rock product producers in Arizona, including Amcord, Inc. The cement litigation originally was instituted in the United States District Court for the District of Arizona and various federal courts throughout the United States, by numerous public and private entities, and was consolidated in the Arizona court which certified the case to proceed in behalf of a national class of purchasers of cement and cement-containing products. The ready-mix count was certified by the court to proceed as a class action in behalf of purchasers of ready-mixed concrete and related products in the state of Arizona.

The settlement of the cement litigation provides for the payment of $8.25 million over a period of years. The settlement of the ready-mix litigation against Amcord, Inc. provides for the payment of $700,000. A related Arizona state court civil enforcement action against Amcord, Inc. and five others, also settled by Amcord, provides for the entry of a consent decree and the payment of $50,000 as a partial reimbursement for costs the state of Arizona incurred in connection with that litigation.

While Gifford-Hill and Amcord denied any violation of federal or state antitrust laws, a Gifford-Hill spokesman said the settlement agreement was made in an effort to avoid the further expense and uncertainties associated with protracted litigation.

Southdown, Inc. and its subsidiary, Southwestern Portland Cement Co., agreed to settle the cement antitrust litigation pending in the U.S. District Court for Arizona and a related Arizona state court action for an aggregate of $6.7 million.

River Cement Co., a subsidiary of IFI International S.A., has agreed to pay $1.75 million to settle the antitrust case against it. The Missouri company is one of 15 cement concerns accused by the state in 1978 of conspiring to fix cement prices. In the settlement, filed in the U.S. District Court in Arizona, the company denied wrongdoing, but entered into the agreement to reduce further expense, inconvenience,

and the distraction of burdensome and protracted litigation.

California Portland Cement Co. announced last September that settlement agreements had been reached with respect to the remaining aspects of the antitrust lawsuits filed against the company in Arizona and consolidated there for pretrial proceedings that pertain to the sale of cement and cement-containing products. The settlement agreements, which require that the company make an immediate payment of $6.5 million into escrow accounts pending final approval by the respective courts before which the actions are currently pending, provide that, in the event of certain contingencies, the company has the option of terminating the settlements. The settlement agreements provide that payments made are not paid as a penalty, fine, or damages for any alleged offense; that the company specifically denies that it engaged in any illegal activity; and that nothing in the settlement agreements may be construed as an admission of liability.

Corporate changes

The corporate structure of the United States cement industry has undergone several major revisions in the past 2 years. The Flintkote Co. became a wholly owned subsidiary of Canada's Genstar Ltd. in 1980. Genstar has four cement plants operating in western Canada (one in each western province). Flintkote's four cement plants are located in Redding, Calif., San Andreas, Calif., Kosmosdale, Ky., and Glens Falls, N.Y.

While Genstar's head office remains in Montreal, the company has established executive offices in San Francisco. The company's operations in the United States are concentrated in the Sun Belt states, from the West Coast along the country's southern tier. Moore McCormack Resources, Inc. has agreed to purchase the Kosmosdale and Glens Falls cement plants from Genstar.

Gifford-Hill & Co., Inc. acquired Amcord, Inc. in December 1979. Gifford-Hill has planned its geographical growth to serve the Sun Belt market areas. Most of the company's construction minerals plants are concentrated within these states.

Before the purchase of Amcord, Gifford-Hill operated two cement plants—one in Texas and the other in South Carolina. The Amcord acquisition added five cement plants, two in California and one each in Arizona, Michigan, and Pennsylvania. The company plans to sell the Michigan and Pennsylvania facilities.

Lone Star Industries, Inc. continued its program of increasing its cement production capabilities. In September 1979, the company acquired the Portland Cement Company of Utah's plant in the heart of Salt Lake City. In March 1980, a Dixon, Ill. plant was purchased from Medusa Corp., a subsidiary of Crane Co. Lone Star acquired OKC Corp.'s newly-expanded cement plant at Pryor, Okla. in May 1980, and, in August 1980, OKC's cement plant and dock facilities in New Orleans, La.

The New Orleans transaction involved the exchange of Lone Star's New Orleans cement plant for OKC's plant plus cash payments. In turn, OKC agreed to sell the Lone Star facilities to Citadel Cement Corp., a subsidiary of Canada Cement Lafarge Ltd.

Citadel closed its Birmingham, Ala. 330,000-tpy wet-process plant in September 1980. Citadel will continue to use the plant's 55,000-ton storage capacity. The company operates a 750,000-tpy dry-process plant at Demopolis, Ala. (100 miles southwest of Birmingham).

OKC Corp.'s stockholders approved OKC's previously announced plans to liquidate last May. As noted, Lone Star has acquired the company's Oklahoma and Louisiana cement plants.

Penn-Dixie Industries, Inc. in April 1980 filed for protection under Chapter 11 of the Federal Bankruptcy Act. Under Chapter 11, the company continues to operate, but seeks court protection from creditor lawsuits while it tries to work out a plan for settling its debts.

Penn-Dixie's cement division operates plants in Nazareth, Pa.; Richard City, Tenn.; Kingsport, Tenn.; West Des Moines, Iowa; West Winfield, Pa.; and Petoskey, Mich. The company has agreed to sell its Nazareth plant to Coplay Cement Co. which is based in Nazareth. Coplay is a subsidiary of Societe des Ciments Francais.

McDonough Co., with operations that include the Gulf Coast Portland Cement Co., has entered into an agreement for a cash merger with Hanson Industries, Inc., a wholly owned U.S. subsidiary of Hanson Trust, Ltd., London.

Other changes in 1979 included: (a) acquisition of Florida Mining and Materials Corp. (with

Portland (Finished) Cement—Value of Shipments From Plants in the United States

	Total value (billion dollars)	Average value per short ton	
		In current dollars	In constant 1977 dollars
1970	$1.30	$17.69	$27.36
1971	1.48	18.74	27.58
1972	1.65	20.31	28.70
1973	1.90	21.88	29.23
1974	2.11	26.52	32.30
1975	2.11	31.09	34.55
1976	2.44	33.86	35.74
1977	2.83	36.36	36.36
1978	3.41	40.70	37.38 (est.)
1979	3.86	46.24	41.4 (est.)
1980 (est.)	4.1	—	—

FIG. 5

Masonry cement shipped by producers in the United States —Value*

	Total value (million dollars)	Average value per short ton
1970	$ 67.537	$22.66
1971	85.774	25.29
1972	102.115	26.52
1973	121.528	29.43
1974	113.030	32.93
1975	113.108	38.90
1976	140.855	42.63
1977	169.491	45.03
1978	209.701	50.53
1979	205.434	54.59

*Includes Puerto Rico.

FIG. 6

a cement plant in Brooksville, Fla.) by Moore McCormack Resources, Inc.; (b) sale of National Gypsum Co.'s cement operations to General Dynamics Corp. The division operates cement plants in Alpena, Mich. and Evansville, Pa.; (c) acquisition of San Antonio Portland Cement Co. in San Antonio, Tex. by a joint venture of Presa S.P.A. Cementeria di Robilante (Italy) and Cementwerke Vigier A.G. (Switzerland); (d) sale of River Cement Corp.'s (subsidiary of Missouri Pacific Corp.) Festus, Mo. dry-process plant to IFI International S.A., a European holding company based in Turin, Italy.

New/Planned projects

Cement plant start-ups, modernizations, and expansions in 1979 and 1980, and projected installations, are listed in this annual roundup. As of December 31, 1979, according to the Portland Cement Association, a total of 11.556 million tons of new or expanded cement capacity had been announced for the United States. Some older plants are expected to shut down, reducing net increases in cement capacity. Portland cement demand is expected to grow at a 2 to 3% rate for the next 5 years. The cost of building a new cement plant today has been estimated at about $100 per ton of annual capacity.

Cement plant data

Alamo Cement Co. (subsidiary: Joint venture of Presa S.P.A. Cementeria di Robilante (Italy) and Cementwerke Vigier A.G. (Switzerland))

• Bexar County, Tex. (outside the metropolitan area of the city of San Antonio): New $50 million clinker-producing plant is scheduled for operation late in 1981. Major equipment and process engineering will be provided by Polysius Corp. Equipment will include: Polysius roller mill for raw grinding; Polysius rotary kiln with Prepol preheater and alkali bypass; Claudius-Peters grate cooler; Polysius roller mill for coke and coal grinding; heat exchanger for recirculating vent air back to undergrate. Civil and structural engineering is being done by Consultec of Mississauga, Ont. Combined capacity from existing San Antonio plant (San Antonio Portland Cement Co.) and new Alamo Cement plant will be 1 million tpy.

Ash Grove Cement Co.

• Louisville, Neb.: Expansion project. Bendy Engineering Co. is providing engineering and construction management for clinker storage, rail unloading, services building, and other plant improvement projects. Humboldt Wedag will provide an 1,800-tpd precalciner kiln system.

Atlantic Cement Co., Inc. (subs.—Newmont Mining Corp.)

• Sparrows Point, Md.: Constructing a slag cement plant at Bethlehem Steel Corp.'s steel facility at Sparrows, Md. The $77 million project will include facilities to granulate and grind blast furnace slag from Bethlehem Steel's "L" blast furnace at Sparrows Point which produces in excess of 800,000 tons of slag per year. Facilities for producing the material will include four granulations, along with grinding and other facilities required for production and shipment by water of slag cement and other slag products. Davy McKee Corp. has been awarded the turnkey contract. The plant is scheduled for completion by mid-1982.

California Portland Cement Co.

• Mojave, Calif.: Addition of a 1-million-tpy plant to the existing 1.1-million-tpy facility is scheduled for completion in 1981. The Kaiser Engineers, Inc. division of Raymond International, Inc., has the contract to supply engineering, procurement, and construction management services for the estimated $100 million modernization and expansion program. Equipment will include: Fuller IHI precalciner; four-stage suspension preheater with flash furnace and 13½ ft. × 225 ft. rotary kiln section; Fuller grate clinker cooler; Allis-Chalmers 250-tph, 2,000-hp roller mill for raw grinding; Humboldt Wedag 1,500-tph impact crusher; Leeds & Northrup dual computer. Coal will be supplied for the plant by the company's Soldier Creek Coal division near Price, Utah.

Columbia Cement Corp. (subsidiary of Filtrol Corp.)

• Bellingham, Wash.: First phase of a $75 million plant expansion has begun. Plans include a new finish mill, new clinker facilities capable of handling clinker shipped in by water and rail, new cement storage silos, and new fuel handling equipment. Plant capacity will be increased to 750,000 tpy of finished cement in this first phase, estimated to cost $15 million. The $60 million second phase will include one kiln rated at 700,000 tpy of clinker, a new raw mill, and modernization of all other plant facilities.

• Zanesville, Ohio: Will undertake a $3.34 million equipment modernization program.

Flintkote Co., The (subsidiary of Genstar Limited)

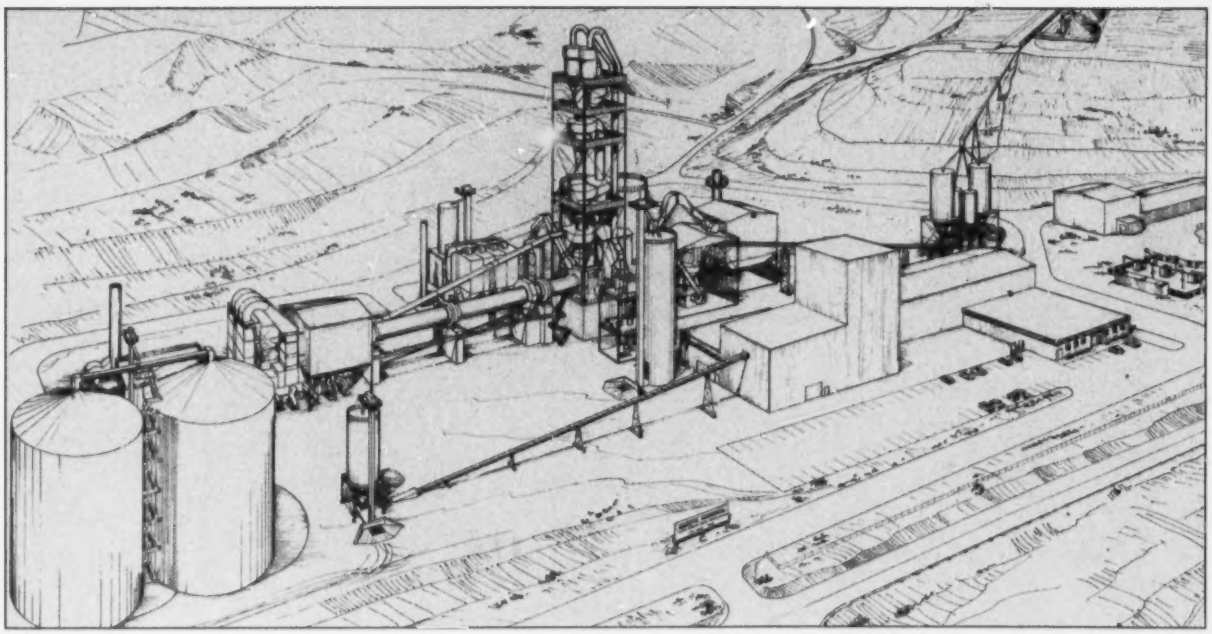
• Redding, Calif. (Calaveras Cement Div.): A $40 million expansion and modernization program, scheduled for 1981 completion, will increase capacity from 290,000 to 600,000 tpy. Equipment includes: F. L. Smidth precalciner/preheater system with 4.35 × 66m rotary kiln section and planetary cooler; 150-tpd raw roller mill; Foxboro control units. Engineering is being handled by Kaiser Engineers.

General Portland, Inc.

• New Braunfels, Tex. (Balcones plant): A new 925,000-tpy, $80 million dry process preheater plant, using coal as fuel, due on stream in 1981. Equipment supplied includes: Polysius 15 ft. × 241 ft., 2,750-tpd rotary kiln with Dopol preheater and Prepol precalciner; 237-tph roller mill; two 96-tph finish mills; C-E Raymond coal mill; Fuller grate clinker cooler; Mikropul dust collectors. Polysius Corp. provided engineering and supplied major equipment. Dyckerhoff Zementwerke AG, West Germany, acted as consultant on design and startup.

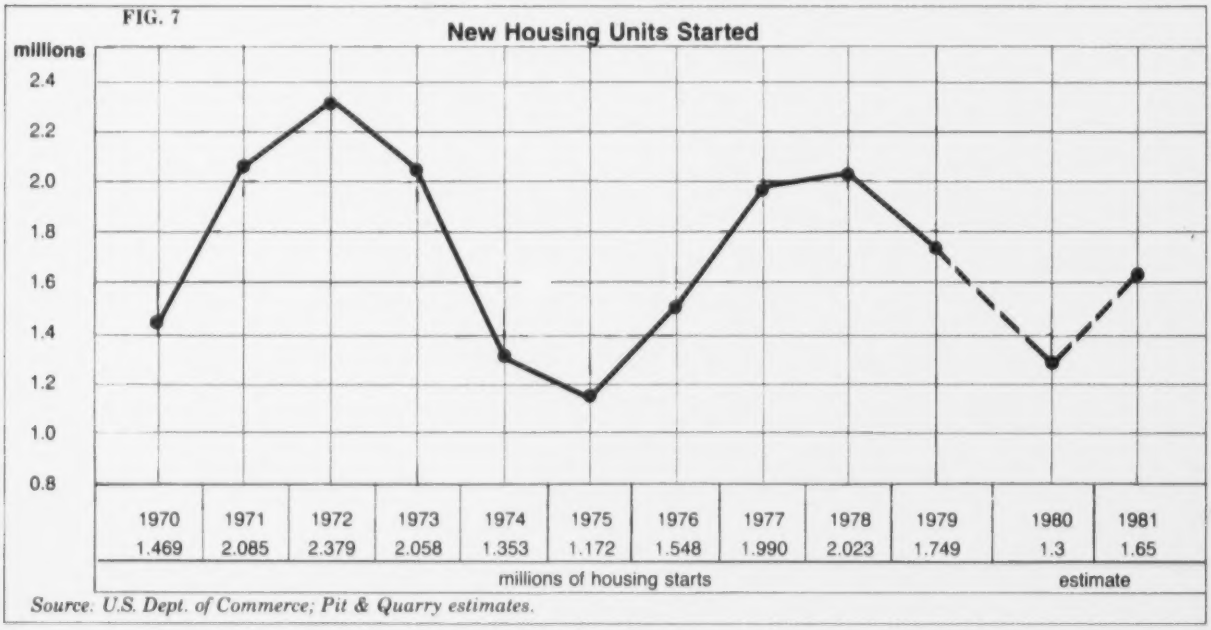
Ideal Basic Industries, Inc. (Cement Div.)

• Theodore, Ala. (near Mobile): New 1.5-million-tpy dry process (precalciner) plant is scheduled to



. . . Artist's conception of the new 1800 standard tpd dry process cement plant to be built at Leamington, Utah for the Martin-Marietta Cement Co. *(Courtesy: Fuller Co.)*

FIG. 7

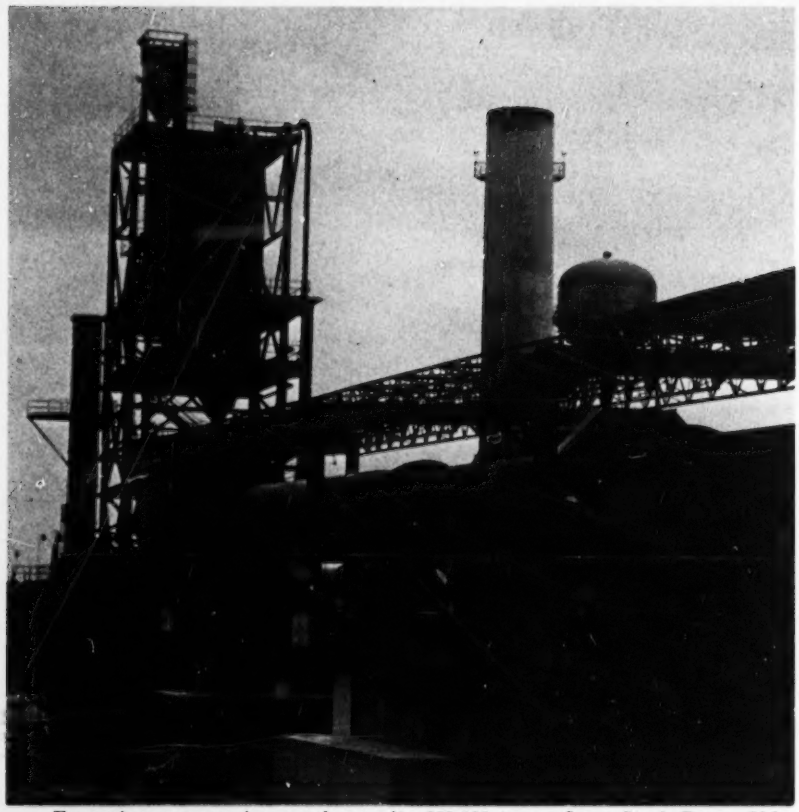


Source. U.S. Dept. of Commerce; Pit & Quarry estimates.

be on stream in 1981. Estimated cost in 1977 dollars is $175 million. A quarry planned in Monroe County, Ala., will supply limestone. Equipment will include: Allis-Chalmers 4,660-tpd reinforced suspension preheater system, consisting of a 260 ft. high suspension preheater tower, a 16 ft. × 280 ft. rotary kiln, and a stoker-type clinker cooler; a Stamler feeder-breaker in the quarry; two Raymond coal mills; 65 Micropulsaire dust collectors; two 15 ft. × 48 ft. 3½ in. F. L. Smidth Unidan finish mills with 6500-hp. motors; four F. L. Smidth cement coolers. This plant eventually will replace the present Mobile plant. Brown & Root designed and are building this plant.

• Knoxville, Tenn.: Preheater-precalciner kiln was installed in 1979, replacing four kilns shut down in February, in order to convert the raw material system from wet to dry process. Capacity increased from 470,000 to 580,000 tpy. Equipment installed includes: Fuller suspension preheater with flash calciner and 12 ft. × 165 ft. rotary kiln section; Fuller grate clinker cooler; Mikropul dust collectors; Stamler feeder-breaker in quarry.

• Boettcher, Colo.: New grate preheater kiln will replace two 50-year-old kilns, to increase capacity from 115,000 tpy to 425,000 tpy. Scheduled for 1981 completion, the project will cost about $34 million. The preheater is especially designed to use the kerogen in the kerogen-bearing



. . . Expansion program increased capacity 280,000 tpy at Lone Star's Pryor, Okla. (formerly OKC Corp.) plant with addition of a Fuller 12×13½×400 ft. rotary kiln. *(Courtesy: Kaiser Engineers, Inc.)*

limestone available in the quarry deposit. According to calculations, the kerogen will provide about one-fourth of the fuel needed. Allis-Chalmers is providing the ACL system, including: 12 ft. 2 in. wide×112½ ft. long traveling grate; 14 ft.×15 ft.×204 ft. rotary kiln; 1,400-tpd roller mill; type MPS 3450, 110-tph roller mill; stoker cooler; 15-ft.-diameter pelletizer pan.

• Devil's Slide, Utah: A new 1-million-tpy plant is being planned to replace the present 360,000-tpy plant.

Kaiser Cement Corp.

• Permanente, Calif.: In a $78.5 million modernization program, a single preheater-precalciner equipped, dry process kiln will replace six oil-fired, wet process kilns. The dry process kiln will burn coal as well as other fuels. Rated capacity will remain the same at 1.6-million tons annually. Lafarge Consultants Ltd. of Montreal was awarded the contract covering engineering design services, procurement assistance, and start-up responsibility. The rebuilt plant was rescheduled for 1980 operation. The designed plant capacity is 1.6-million tpy. The equipment includes: an Allis-Chalmers 5,000-tpd reinforced suspension preheater with a 16 ft.×250 ft. rotary kiln section; two Raymond coal mills; two 15 ft.×53½ ft. Humboldt Wedag center-discharge raw mills, each equipped with a 5,000-hp single-pinion gear drive (preheater waste gases will be used for drying the mills).

• San Antonio, Tex. (Longhorn plant): A second preheater-precalciner tower will serve a dry process kiln installed during a partial modernization and expansion in 1975. The $14.5 million project will double the capacity of the kiln to 5,000 tpd. Equipment includes: Humboldt Wedag Pyroclon suspension preheater system with precalciner; new coal grinding system; additional clinker cooling; and new raw meal silo. On stream in 1979.

• Lucerne Valley, Calif.: Plans for a $124.5 million modernization and expansion program for this 1.015-million-tpy wet plant have been announced. A computer-controlled, preheater/precalciner kiln system will replace the wet process. Capacity is slated to increase to 1.5-million tons. Operation is scheduled for mid-1982. Equipment includes: 4,500-tpd Allis-Chalmers RSP tower, 300 ft. high and 16 ft.×250 ft. kiln; Claudius-Peters recuperator/cooler; 7,000-hp FLS center-discharge raw mill; 4,000 hp, 13 ft.×42 ft. Compeb Allis-Chalmers finish mill; baghouse for kiln and mill; digital process and motor control.

Lehigh Portland Cement Co. (subsidiary of Portland Zementwerke Heidelberg A.G., W. Germany)

• Alsen, N.Y.: Planning 315,000-tpy expansion; scheduled 1983.

• Union Bridge, Md.: Planning 500,000-tpy expansion.

Lone Star Industries, Inc. (Cement & Construction Materials Group)

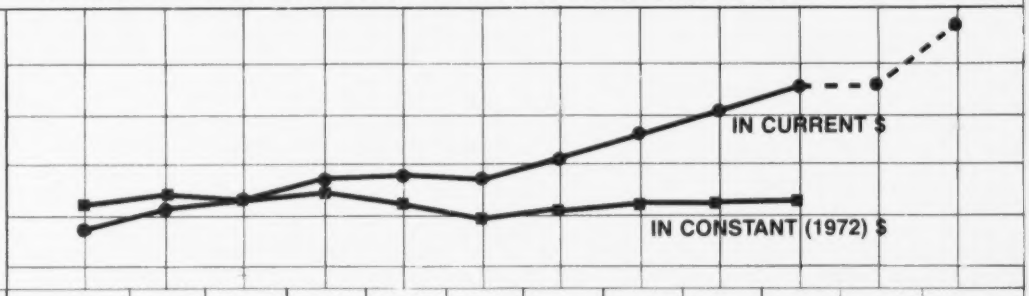
• Santa Cruz, Calif.: Expansion and modernization, scheduled for late 1981 completion, will increase capacity from 395,000 to 750,000 tpy. Equipment supplied includes: F. L. Smidth four-stage preheater-precalciner unit with 13 ft.×184 ft. rotary kiln section; Folax grate clinker cooler; raw roller mill; homogenizing/kiln feed silos; new cement grinding mill; additional electrostatic precipitators; C-E Raymond bowl mill; 18-ft.-diameter air separator. Engineering planning was carried out by Bendy Engineering Co. and SPCM, Inc.

• Georgetown, Tex.: New 1-million-tpy plant to be constructed on property owned by Texas Crushed Stone, Inc.—scheduled for completion in 1982.

• Grantsville, Utah: Planning new 500,000-tpy plant, scheduled for completion in 1982.

• Salt Lake City, Utah (Portland Cement Co. of Utah): Added an Allis-Chalmers 11 ft.×300 ft. kiln to replace two small kilns and increased plant capacity 30% to 420,000 tpy (wet process). Other new equipment included a Fuller grate cooler and a Wheelabrator filter-bag dust collector. Donald R. Warren Co. was the engineering consultant. On

FIG. 8 **Value of Total New Construction Put In Place In The United States**



	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
In current $	94.86	109.95	124.09	137.92	138.50	134.54	151.05	173.98	205.46	228.95	228.3 estimate	270.3
In constant (1972) $	107.01	116.04	124.09	126.92	109.13	97.23	105.00	111.33	116.94	114.70	—	—

Source: U.S. Dept. of Commerce

FIG. 9 **Cement Consumption—By Portland Cement Association Region (Percent)**

						Estimates		
PCA Region	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1985**
Eastern	18.93%	17.20%	16.29%	16.83%	16.79%	17.2 %	17.1 %	15.2 %
Great Lakes—Midwestern	18.53	19.03	18.27	17.74	17.01	15	15.2	15.8
Southeastern	15.13	15.24	15.78	16.43	15.78	17.1	17	16.7
North Central	7.14	7.38	6.78	6.44	6.40	5.8	6	6.4
Rocky Mountain—Northwest	7.70	8.33	8.28	8.23	8.55	8.1	8.2	9.2
Pacific—Southwest	13.05	12.90	13.91	13.65	14.86	14.3	14.3	15.5
South Central	19.52	19.92	20.69	20.68	20.61	22.5	22.2	21.2
Total:								
Percent	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Million short tons	67.025	70.699	77.090	83.250	83.250	73.395	76.400	90.1

Based on data in "U.S. Cement Consumption Forecast," April, August, and October, 1980, Portland Cement Association, Robert Roy, Economist.

stream in 1979.

• Pryor, Okla. (OKC Corp., Oklahoma Cement Co. Div.): A $28 million expansion program increased capacity 280,000 tpy. On stream in 1979. Fuller Co. supplied most of the equipment, including: 12 ft. × 13½ ft. × 400 ft. rotary kiln; grate clinker cooler; 12 ft. × 26 ft., two-compartment ball mill; bag-type dust collectors. A C-E Raymond coal mill also was installed. This was a Kaiser Engineers project.

Marquette Co.
(Subs. of Gulf & Western Industries, Inc.)

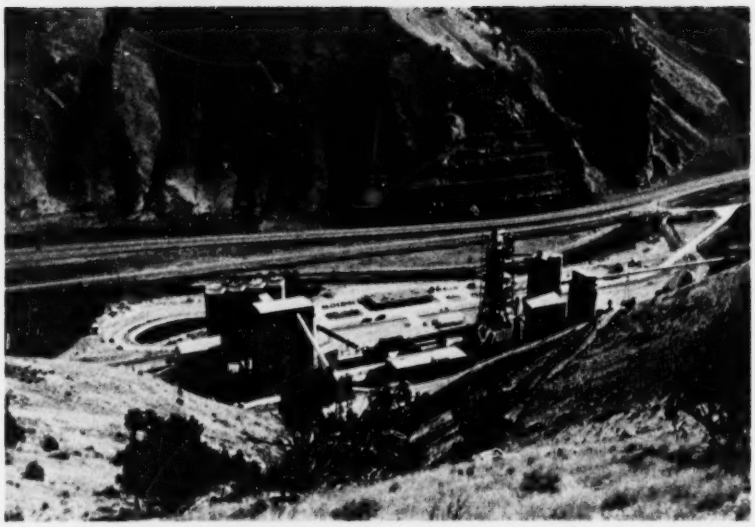
• Cape Girardeau, Mo.: New $80 million, 1.2-million-tpy dry process plant at the same location. Kaiser Engineers is providing engineering, procurement, and construction services. Completion is scheduled for early 1981. Equipment supplied is to include: Allis-Chalmers four-stage reinforced suspension preheater with a 14.5 ft. × 235 ft. rotary kiln section; Allis-Chalmers stoker-type grate clinker cooler; two Allis-Chalmers 13 ft. × 52 ft., 4,500-hp Compeb finish mills; C-E Raymond raw roller mill rated at 250 tph and driven by a 3,000-hp motor; two Raymond 21-ft. diameter air separators for the finish mills; two C-E Raymond bowl-type coal mills; Envirotech-Buell electrostatic precipitator; baghouses; and cyclone dust collectors. Instrumentation will be a combination of Eagle Signal, G & W Manufacturing Co., and Swanson Engineering Co. equipment and will incorporate an on-line computer system consisting of three CRTs with a complete plant display panel board.

Martin Marietta Corp.

• Buffalo, Iowa (near Davenport): New 850,000-tpy, $80 million dry process coal-fired plant is scheduled to go on stream in 1981. Equipment to be supplied includes: F. L. Smidth preheater/precalciner kiln with 14 ft. × 200 ft. rotary kiln section and a 924S Folax grate cooler; Allis-Chalmers multi-compartment rotary Compeb mill, 15 ft. × 53 ft., 7,000 hp; Allis-Chalmers 230-tph roller mill, 1,500 hp. Kaiser Engineers is providing engineering and design services.

• Lyons, Colo.: Long-kiln, dry process plant conversion to flash calcining system via a $6.8 million contract with Fuller Co. The 14¼ ft. × 17 ft. × 490 ft. rotary kiln will be cut to 14¼ ft. × 245 ft. A Fuller SF 135 suspension flash calciner, with a modified Stage IV cyclone, will be used to preheat and partially calcine the raw materials. The plant's existing direct coal-fired system will be converted to a semi-direct system to permit use of pulverized coal for the kiln and the flash calciner. After the conversion, rated capacity will be 1,250 tpd. Kerogens in the shale portion of the raw materials will be burned off in the flash calciner. Start-up was scheduled for 1980.

• Leamington, Utah: New 650,000-tpy plant scheduled on stream in 1982. Fuller Co. and S.&W. Construction Co. of Tennessee are joint venturers on the $67.5 million project. Fuller will provide design, engineering, and equipment for the plant. S.&W. Construction will build the plant near Leamington, about 100 miles south of Salt Lake City.



. . . Oregon Portland Cement Co.'s new 500,000 tpy plant in Durkee, Oregon (see Pit & Quarry, July 1980) includes F.L. Smidth's 4-stage cyclone preheater unit with rotary kiln section and Unax cooler.

Fuller equipment will include: 1,800-tpd suspension preheater/flash calciner/coal-fired rotary kiln; Fuller-Loesche roller mill, 160 tph; two Airmerge blending systems, rated at 3,000 tons each; FK pump for raw mix; coal roller mill; inclined grate cooler; heat exchanger; Plenum-Pulse dust collector; and a 13½ ft. × 47 ft. finish mill.

Medusa Cement Co. (subs. of Crane Co.)

• Charlevoix, Mich.: Conversion from wet to dry process in a $50 million project; capacity increase from 2,400 to 4,400 tpd in the dry process; on stream in 1980. Kaiser Engineers handled engineering, equipment procurement, and construction management services. Equipment includes: Fuller four-stage suspension preheater/flash calciner system; AAF-Elex electrostatic precipitator; Polysius 360-tph double-roller raw mill; C-E Raymond coal bowl mill; Fuller Airmerge blending system; gravel-bed clinker cooler; Foxboro electric control system. The existing 18½ ft. × 17 ft. × 18½ ft. × 580 ft. rotary kiln was cut to a 18½ ft. × 17 ft. × 350-ft. length.

Monolith Portland Cement Co.

• Monolith, Calif.: Doubling capacity to 1-million tpy. Equipment ordered includes: F. L. Smidth 12 ft. × 13½ ft. × 450 ft. wet process rotary kiln rated at 900 tpd; Folax clinker cooler; Tirax coal mill. Scheduled on stream in 1981.

• Laramie, Wyo.: Increasing capacity from 200,000 tpy to 500,000 tpy, with addition of a new kiln, clinker cooler, coal mill, finish mill, pollution control equipment, and associated equipment. Scheduled on stream in 1980.

Moore McCormack Resources, Inc.

• Brooksville, Fla. (Florida Mining & Materials Corp.): A $68 million expansion program will double plant production to 1.2 million tpy. The company is adding a second coal-fired kiln and is increasing grinding and storage capabilities. New kiln is expected to be operational in 1982. Polysius will supply the equipment, including: Gepol preheater/kiln rated at 1,650 tpd; Air-swept raw mill, 153-tph capacity; two-compartment finish mill rated at 100 tph; and related equipment and instrumentation. Fuller Co. will supply two fabric-filter, dust-collection systems.

Oregon Portland Cement Co.

• Durkee, Ore.: New 500,000-tpy $37 million dry-process plant placed on stream in 1979. F. L. Smidth supplied most of the equipment, including: four-stage cyclone preheater unit with rotary kiln section and Unax cooler; 2,100-hp Tirax Unidan drying and grinding mill; homogenization system; 4.35 × 66m gas conditioning tower and precipitator; Tirax coal mill; 4,000-hp Unidan 13 ft. × 47¼ ft. finish mill; cement coolers; and electrostatic precipitators.

SME Cement, Inc.

• Middle Branch, Ohio: Former Diamond Portland Cement Co. plant, purchased in 1960 by Flintkote, was sold by Flintkote to Standard Machine and Equipment Co. in 1977. The plant was incorporated as SME Cement Inc. in 1978 as a wholly owned subsidiary of Standard Machine & Equipment. Two of the plant's kilns, all of which had been shut down, were again placed in operation in 1979, with an estimated capacity of 1,000 tpd.

Texas Industries, Inc.

• Hunter, Tex.: New 550,000-tpy $50 million dry-process plant on stream in 1980. Equipment includes: Polysius 12 ft. × 284 ft., 2,000-tpd rotary kiln with Dopol preheater and Prepol A5 precalciner; 165-tph roller mill; homogenizing systems; and central control panel and instrumentation. ●

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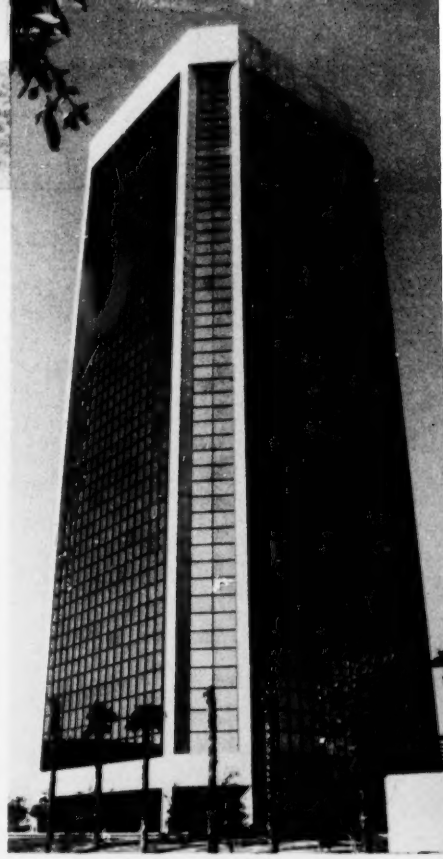
Construction



After sharp decline in '80, construction should rebound in '81

BY JIM KOSTKA

Forecasters of the construction industry probably were in a frenzy in October 1980 when interest rates suddenly surged upward after being relatively stable for a period of about 6 months. These prognosticators of what is in store for the construction industry in 1981 had already made their predictions and were waiting for the appropriate time to release them. When the prime rate on borrowable money jumped from 13 to 16¼% within a 4-week period between late October and mid-November, the forecasters made a mad scramble to revise their figures for both 1980 and 1981 construction.

This dilemma, facing those who try to predict what will happen in the construction industry, clearly illustrates how sensitive this industry is to the cost of borrowing money. Rising interest rates cause construction projects to be postponed until such time when lower rates make borrowing money more attractive. Stated simply, when it becomes more expensive to borrow money, construction declines. Conversely, when it costs less to borrow money, construction activity is stimulated.

Most recessions in the past have been caused by the unavailability of financing capital. This is not true this time. Plenty of money is available, but it's too expensive to borrow. This is the result of a preconceived plan by the government to raise the prime interest rate in order to control the inflation which has plagued us for a number of years. So far, the policy has slowed inflation to some extent but not to the degree anticipated.

In spite of the high level of interest rates late in 1980, the two major forecasters of the construction industry—F.W. Dodge and the Commerce Department's Bureau of Industrial Economics (BIE)—predict construction gains for 1981. Both feel interest rates will have peaked by the end of 1980 and will ease downward gradually in 1981. As a result, construction activity is expected to climb.

Because these two construction forecasters do not cover all of the same construction categories (BIE is broader in scope), a direct comparison can't be made of their individual forecasts. Keeping this in mind, F.W. Dodge anticipates a 25% increase in the dollar value of construction in 1981 while BIE is looking for an 18% gain.

Based on the Bureau of Industrial Economics figures, the value of U.S. construction in 1980 was $228.3 billion. This is slightly below the 1979 total. Some optimism is shown in the BIE 1981 figures which indicate construction will rise to a total of $270.3 billion—an 18% increase. However, due to the existing inflation factor, the actual physical amount of construction put in place will show an increase of about 6%. This, of course, could go considerably higher if interest rates would decline rapidly, but the prospect of that happening is rather remote.

Private construction

More than three times as large as public construction, the private construction sector exerts a considerable amount of influence on the construction picture as a whole. In 1980, the value of private construction amounted to $171.6 billion—5% below the previous year. In 1981, private construction is expected to bounce back with a 20% gain when its total reaches $206.7 billion. A substantial part of this increase will come from new housing units which are counted on to register a 37% increase in value.

Public construction

The public construction sector, which fared better than the private sector in 1980, moved upward by $7.7 billion over the previous year; its total reached $56.7 billion. This was an increase of 16%. A continued gain is forecast for this type of construction in 1981, but at a more moderate rate of climb. The value will reach $63 billion, surpassing the previous year's total by 12%.

Although all segments of public construction are expected to register gains in 1981, except for hospital construction which is expected to remain the same as 1980, the housing and development and highway and streets construction will provide the largest gains.

Because public construction is government-funded, the various types of construction making up this segment of the construction industry remain at a fairly even keel and do not experience the sharp rise and fall of some of the segments in the private sector.

Type of construction	(in millions of current dollars) 1979	1980[1]	Percent change 1979-80[2]	1981[1]	Percent change 1980-81[2]
Total new construction	228,950	228,300	0	270,300	+18
Private construction	179,948	171,600	−5	206,700	+20
Residential buildings	99,030	84,000	−15	109,800	+31
New housing units	78,587	60,800	−23	83,000	+37
Additions and alterations	18,236	20,000	+11	23,000	+15
Nonhousekeeping	2,206	3,200	+45	3,800	+20
Nonresidential buildings	47,298	53,100	+12	60,700	+14
Industrial	14,950	13,800	−8	15,200	+10
Office	9,461	13,200	+40	17,200	+30
Other commercial	15,463	17,800	+15	19,600	+10
Religious	1,548	1,600	+5	1,700	+5
Educational	806	1,200	+50	1,300	+10
Hospital and institutional	3,530	3,500	0	3,500	0
Miscellaneous	1,540	2,000	+30	2,200	+10
Farm, nonresidential	5,700	5,700	0	5,700	0
Public utilities	26,467	27,300	+3	28,900	+6
Telephone	6,343	7,300	+15	8,400	+15
Electric light and power	16,009	15,200	−5	13,700	−10
Gas	2,266	2,700	+20	4,300	+60
Railroad	1,259	1,500	+20	1,800	+20
Petroleum pipelines	591	600	0	700	+10
All other private	1,452	1,500	0	1,600	+10
Public construction	49,003	56,700	+16	63,600	+12
Buildings	15,857	18,100	+14	20,100	+11
Housing and redevelopment	1,211	1,600	+35	2,000	+28
Industrial	1,411	1,800	+30	2,300	+30
Educational	6,903	7,700	+12	8,500	+10
Hospital	1,648	1,600	0	1,600	0
Other public	4,684	5,400	+15	5,700	+5
Highways and streets	11,915	15,500	+30	17,800	+15
Military facilities	1,640	1,700	+5	2,000	+20
Conservation and development	4,587	5,000	+10	5,500	+10
Other public construction	15,002	16,400	+9	18,200	+11
Sewer systems	7,298	7,700	+5	8,500	+10
Water supply facilities	2,490	3,500	+40	4,200	+20
Miscellaneous	5,215	5,200	0	5,500	+5

[1]*Estimated by Bureau of Industrial Economics*
[2]*Percent changes were derived by using unrounded figures for projected data.*
Source: Bureau of the Census and Bureau of Industrial Economics (BIE)

Residential buildings

An example of the importance of this particular construction category is its relative size. In 1980, private residential construction totaled $84 billion and represented 37% of all construction that year. This category is counted on to capture an even greater share of the construction market in 1981 when it jumps to $109.8 billion, a 41% slice of the entire construction dollar volume. New housing units will be the primary reason for this gain. A drop of 23% caused this category to fall to $60.8 billion in 1980. However, in 1981, predictions say it will soar 37% by reaching $83 billion.

Housing starts, which were running at a rate of 2 million units 2 years ago, dropped to 900,000 in May 1980. When interest rates on home loans fell to about 12% during the summer, customers resumed shopping for new homes. In September, housing starts rose to an annual level of 1.5 million units, but the increase was largely due to federally subsidized apartments that builders had to get under way before September 30 when the government closes the books on its fiscal year. And although interest rates rose sharply during the middle of the last quarter of 1980, economists feel the rates are headed toward a gradual decline starting early in 1981, thereby stimulating a demand for residential construction.

After dropping to an estimated total of 1.25 million units in 1980, housing starts are expected to bounce back to a total of 1.65 million units in 1981, according to F.W. Dodge. This total is most likely to consist of 1,100,000 singles, 180,000 condominiums, and 370,000 apartment units.

The United States needs an estimated 2.4 million new dwellings annually to meet existing demand, but only once in the past 5 years (in 1978), has the housing industry come close to that mark. This is causing a pent-up need for housing, and, as this need accumulates, prices on existing housing continue to escalate.

At 1981 prices and interest rates, not every family that seriously intends to purchase a new home will be able to realize that goal. Therefore, the alternative in many cases will be going into apartments, condos, existing one-family homes, mobile homes, conversions, or rehabbed units. Of

these various options, condominiums, with their advantage of value appreciation and tax deduction, are obviously the most viable alternative to conventional one-family ownership of this segment of the housing market. This type of housing also has considerable appeal to couples who have raised their families and are alone because their children have married and left home.

Expenditures for additions and alterations will continue to rise, going from $20 billion in 1980 to $23 billion in 1981, an increase of 15%. It is a common practice during a recession period for people to make-do until times get better and, as a result, more money is spent on home improvements than during normal times when buying a new house would have greater appeal.

Non-housekeeping construction, which consists largely of hotel and motel construction, rose a substantial 45% in 1980 to $3.2 billion. It appears destined to grow another 20% in 1981, reaching a total of $3.8 billion.

Nonresidential buildings

This category consists of industrial, office, other commercial, religious, educational, hospital, and institutional buildings. Combined, all nonresidential buildings construction will be up a modest 14% in 1981 with a total of $60.7 billion.

Industrial construction, which was down 8% in 1980, will be up 10% in 1981, reaching $15.2 billion. Office building construction, although easing off a bit from its 40% gain in 1980, will show a respectable increase of 30% in 1981 by reaching the $17.2 billion mark. Other commercial building will move up a bit to $19.6 billion—a 10% gain. Religious and educational construction are counted on for respective increases of 10 and 5% and values of $1.7 and $1.3 billion. Hospital and institutional construction, however, will show no gain, remaining at $3.5 billion.

Farm construction

Nonresidential farm construction has been static for the past 2 years, remaining at $5.7 billion. No change is anticipated for 1981 when farm construction continues to move laterally. For a number of years, the trend has been toward fewer, but larger, farms. This has discouraged some would-be farmers from getting into farming and, as a consequence, new farm construction has suffered. This swing toward larger farms will continue because the small farmer can't afford the expensive equipment used by the large producers; therefore, he is unable to compete on an equal basis.

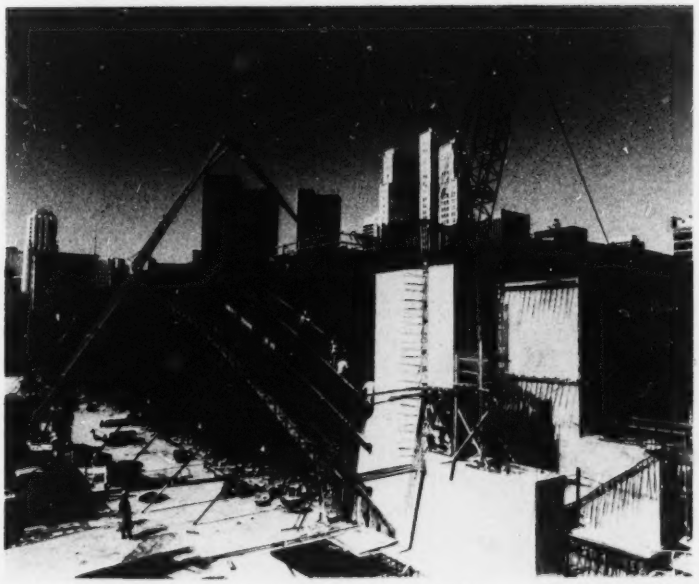
A 17-story housing structure for the elderly using precast components. The value of new housing units will show a 37% gain in 1981 after a 23% decline in 1980.

Public utilities

All public utility construction, except electric light and power, will show an increase in 1981. Leading the gains is the gas segment with an increase of 60%. Much of this gain is due to several new pipelines that have started or are about to start construction.

Apparently, the drop in electric light and power construction is the result of the anti-nuclear sentiment shown by a very vocal group in this country. Because of their protests, a number of atomic powered facilities in various stages of construction have stopped building. However, since President-elect Ronald Reagan is in favor of the use of atomic energy for producing electricity, this impasse may be over soon.

The construction of telephone



Construction of San Francisco's Moscone Center under way. This $115-million structure will add to the value of miscellaneous nonresidential buildings in 1981 when it is due to be completed.

facilities appears to be headed for a 15% gain, the same as 1980. An increase in family formations and housing starts will be necessary before this public utility segment shows a more dramatic increase.

Railroad construction will be up 20%, a repeat of its 1980 gain. Most of the construction by this segment will be repair of roadbeds that have been neglected by the railroads for quite some time.

Petroleum pipelines should ease upward about 10% in 1981, after showing no gain in 1980. As new oil fields are discovered, new pipelines will have to be built to distribute the oil.

The combined public utility construction, with a 6% increase in 1981, represents the smallest gain of any construction category. Much of this is due to the poor showing electric light and power construction is expected to make. In dollars, this category will reach a value of $28.9 billion in 1981; it was $27.3 billion in 1980.

Public buildings

Led by public housing and redevelopment's projected 28% increase in 1981, this construction category will post a 12% gain in 1981—slightly below the 14% increase registered the year before.

The largest segment of this category, educational construction, should be up 10% with $8.5 billion worth of construction, followed by other public, industrial, and housing and redevelopment with figures of 5, 30 and 28% on the plus side, respectively. Hospital construction, the only segment of this category not expected to show a gain in 1981 will have $1.6 billion in construction, the same as the previous year.

Highways and streets

The substantial 30% recorded by this category in 1980, with a value of $15.5 billion, will be curtailed a bit in 1981 when construction of this type climbs to $17.8 billion for an increase of only 15%. Although no major highway construction projects are scheduled for 1981, a considerable amount of repair work is needed on existing highways and roads. Much of the 42,000 miles of construction put down for the federal highway program is now more than 20 years old; some of it badly needs repair. Therefore, keeping this major highway network in repair, plus the many other highways and roads that require maintenance, creates a never-ending demand for construction in this category.

Military facilities

Government spending for military facilities has been held down in recent years because of the attitude that money alloted to this category could be better spent elsewhere. This feelng is beginning to change and will continue to do so with Ronald Reagan as president. When campaigning for the office, he promised that our arms capabilities would be built up to a point where we would not have to fear any foreign power. In doing this, military facilities would have to be expanded.

In 1981, the value of military facility construction will be up 20% as it reaches the $2 billion level. This compares to a total of $1.7 billion and an increase of 5% in 1980.

Conservation and development

The 10% gain in construction in this category will be matched by a similar increase in 1981. Value of 1981 construction will amount to $5.5 billion.

In an effort to conserve natural resources and rehabilitate the land, a strong push is being made on the local and federal level to regulate the use of the land and the minerals it contains. Various laws and regulations have been passed to ensure that the land is returned to its previous natural condition.

Other public construction

This category consists of sewer systems, water supply facilities, and miscellaneous construction. Combined, construction in this category totaled $16.4 billion in 1980, representing a 9% increase over the previous year. A further gain of 11% is in prospect in 1981 when the total is slated to reach $18.2 billion.

Water facilities are counted on for a 20% gain in 1981 with a total of $4.2 billion. Sewer systems should be up about 10% and reach a total of $8.5 billion. Miscellaneous construction in this category showed no gain in 1980, but will rise about 5% in 1981 and reach $5.5 billion.

Construction in this particular category is related to housing starts. As the demand for housing grows, so does the need for water and sewer systems; therefore, the outlook for this particular category is bright because housing starts are certain to rise during the next several years. ●

From national association leaders:

CEMENT INDUSTRY FORECASTS MODERATE DEMAND RISE

Richard E. Reuss
President
Portland Cement Association

Cement demand in 1980 declined about 12% compared with 1979. A moderate increase in shipments is expected in 1981, although the upturn is forecast to be limited to about 4% in view of the persistent sluggishness of the construction sector.

Home building is projected to rise as much as 34% from its 1980 recessionary low, although industrial and commercial construction may continue to fall through mid-year 1981. Nonbuilding construction will stay at 1980 levels and the public building sector is expected to continue its long-term decline. Further, it is likely that high interest rates and inflation throughout the year will continue to impede construction activity in all categories.

We expect 1980 cement consumption in the United States to total about 73.4 million tons. Although volume this year was 12% below 1979 demand, shipments still were 9% ahead of the 1975 low in the previous recession.

U.S. cement manufacturers have not had to bear the full burden of a declining 1980 cement market because a sharp decrease in cement and clinker imports accounted for as much as 40% of the total drop in U.S. cement consumption through the third quarter. For all of 1980, imports apparently will total only about half the record 9.4 million tons imported in 1979.

Construction outlook

As usual, housing will be the key to any significant recovery in the construction sector. If we assume that there will be some improvement in inflation and interest rates in 1981, home building is expected to rebound noticeably—from 1.2 million starts in 1980 to 1.6 million in 1981. In terms of square feet of construction contract awards, residential building is expected to grow 34% to about 2.3 billion sq. ft. This favorable outlook assumes that mortgage rates will stabilize by mid-year at about 12% or lower, and that the savings and loan industry will have sufficient funds to support the higher level of activity.

Industrial and commercial construction remained relatively strong in the first half of 1980 but began its decline in the second half under the pressure of high interest rates; the sector will continue to show weakness at least through the first half of 1981. Construction of manufacturing and office facilities is expected to decline by 8% to 850 million sq. ft. next year.

However, when industrial and commercial building does recover, it should not be impeded by a large inventory of unoccupied floor space as it was in 1976. Vacancy rates have remained low and rentals have been firm through 1980 in most regions. Moreover, the demand for office buildings will be high through the 1980s, and the drive to increase labor productivity and energy efficiency should spur industrial construction as well.

Nonbuilding construction in 1980 was depressed by the Administration's attempts at budget-balancing. For 1981, nonbuilding will grow only about 10% in real terms under the austere federal budget proposed for fiscal year 1981. Normally, a much larger gain in nonbuilding construction could be expected after a very weak year like 1980.

Finally, public building is expected to drop 9% this year and remain flat in 1981. This sector is in long-term decline, now accounting for less than 7% of all construction compared to 15% in the late 1960s.

1981 cement outlook

For 1981, cement consumption is forecast to increase by 4% to approximately 76 million tons with most of the gain coming from residential construction.

All regions in the country are expected to perform better, although the largest gains will likely be in the Great Lakes-Midwest, North Central, and Rocky Mountain-Northwest regions, the areas which experienced the sharpest declines in 1980.

Post-recession outlook

A 6-year forecast, published by the Portland Cement Association

in August 1980, indicates that cement demand may reach an average of 85 million tons per year following the current recession.

The forecast predicts that cement shipments will recover slowly in 1981, then rise more sharply through 1985, possibly reaching 90 million tons as early as 1983. The PCA projection is a consensus forecast based on separate estimates of housing activity made by three organizations—Data Resources, Inc.; Townsend-Greenspan & Co.; and the National Association of Home Builders.

Although the three housing forecasts differ in their cyclical patterns, the projections all assume a marked increase in new household formations and a resulting high demand for new housing units in the next 5 years.

If it does occur, the projected increase in housing and housing-related construction will produce the highest growth rate in cement consumption since the 1950s. But, this is not to say that the cement industry will be unaffected by negative influences in the post-recession period. Government regulation, inflation, and high capital and energy costs will continue to hinder the growth of all industries, including cement. Financial market developments will be especially critical to the construction and cement industries, and persistently high interest rates could severely restrict building. In addition, domestic cement producers face tough competition from manufacturers of other building materials.

As we view the pent-up demand for new construction in the 1981-1985 period, however, the cement industry's prospects for a period of record growth in the 1980s become increasingly bright.

CRUSHED STONE REVIEW

William L. Carter, President National Crushed Stone Association

The aggregates industry historically has lagged 6 to 12 months behind a general business recession—going into economic decline and coming out. Accordingly, NCSA surveyed its membership in April of this year in an effort to track the economy of the industry more closely and aid the industry in predicting economic turns. Subsequently, the National Bureau of Economic Research has decided on January 1980, as the official beginning of the recession in the United States. That designation corresponds to NCSA's previously announced predictions, including the association's forecast of at least a 6-month lag period for the industry—until June or July when the real crunch would be felt.

Almost every crushed stone producer whom the association contacted in April—both large and small operators in every region of the country—foresaw a significant decrease from the 1979 volume levels in 1980 and 1981. It seemed probable at that time that, since much of the industry was engaged in pre-contracted work, business would hold stable into or through the third quarter of 1980, with a sharp decline in the fourth quarter.

At the same time, most producers projected a sharp upturn in volume in either late 1981 or in 1982. They were recognizing, for the first time, definite indications of a trend in the industry's economy. For example, while steady annual growth in volume was forecast by most producers after 1981, another decline was foreseen in 1986. The pattern is a cyclical one, beginning in the late 1960s. A short recession, perhaps better termed a "slump," occurred in 1967-1968; a relatively short but more severe recession occurred in 1974-1975. And now the industry faces what many think will be a 1980-1981 recession, although there are reasons to believe its severity and duration may be more sustained.

The aggregates industry has become subject to a cycle of economic trends, and downturns in the general economy have begun to have a progressively more pronounced effect on it than in the past. It is likely that for the aggregates industry, with its lag period, the 1980 recession will indeed be long and deep.

To explain this forecast requires a retrospective look at the many years of national economic stability and market stability for the aggregates industry. An examination of the sources of that stability reveals a great deal about the cause of the current volatility.

For nearly 30 years, until the early 1970s, there was rapid growth in the aggregates industry. Construction of the Interstate Highway System, beginning in 1956, accounted for stability following the Second World War and the Korean conflict and continuing through the 1960s. Contributing to the prosperity of the late 1960s and early 1970s was the housing and general construction boom which resulted from the "World War II babies" entering the job and home markets. These phenomena, occurring in a balanced, stable economy with a low inflation rate, served to insulate the aggregates industry from the trends of the general economy.

But the industry has indeed become susceptible to the economic turns of the primary pri-

vate market in the last 15 years, particularly in the last 5 to 10 years. Severe "supply side" problems have occurred in basic industries such as agriculture and energy and have had a dramatic negative effect on inflation and high interest rates. In turn, persistent inflation and interest rates have led up to the severe "demand" problems seen in the auto, steel, housing, and general construction industries, while causing consumer prices in those industries to jump skyward.

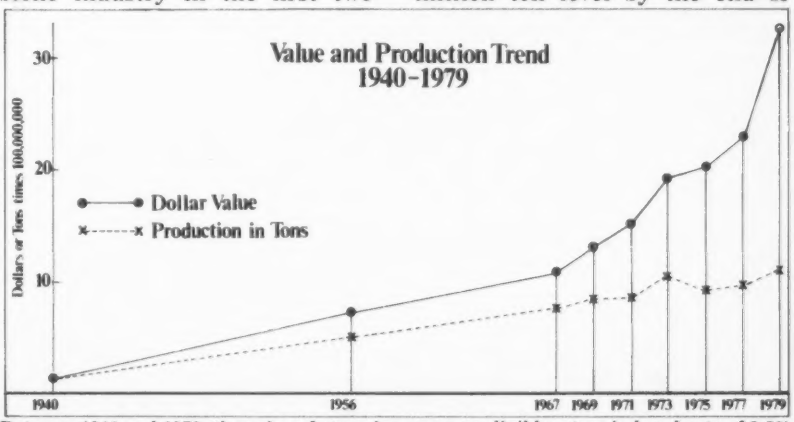
No less important, with major interstate highway work completed and Congress ostensibly trying to tighten its belt on public works projects of all kinds, public works funding now accounts for an ever-diminishing percentage of total aggregate sales. Both primary markets—the public and the private—are in decline today. Crushed stone producers are expressing grave concern not only about the future funding of public works, but also about the amount of in-place construction which the forecast dollars will be able to purchase. In short, public works no longer smoothes over the fluctuations in the primary private market.

It is exceedingly difficult to say whether inflation, in itself, is a cause or a result of general economic conditions. Doubtless, it is incorrect—futile at best—to assign blame to any single component factor in the economy. There are those who champion "supply side" economic policy as the great savior, and those who take the view that the economy needs to be bolstered on the "demand side" in order to invigorate the economy and reduce inflation. The mean between the extremes usually holds the most truth: the imbalance among the most basic commodities in the economy—some suffering demand problems and others supply side problems—has forced a rise in prices and a subsidence in healthy economic activity. Since the first minor industry recession in 1967-1968 and particularly since the 1974-1975 recession, the effect of declining production volume on total dollar value of production has been wholly dependent on the whims of inflation. The trends, however, indicate that as inflation escalates, the economic dip becomes more severe and prolonged; the recovery becomes shorter in duration, sharper in production volume, but especially sharper in dollar value.

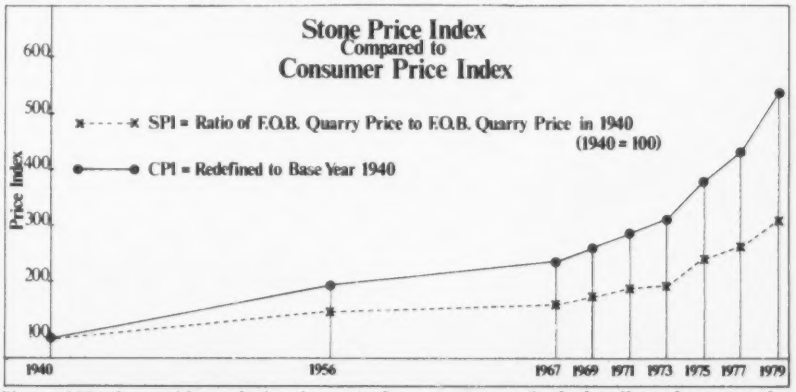
All of this is verified by another recent informal survey of NCSA's membership. The April survey, which had indicated that pre-contracted work would last into or perhaps through the third quarter of 1980, has not held. It was hoped that pre-contracted work would maintain total production and dollar value at reasonably stable levels for the year. But in the absence of new contracts, pre-contracted work was largely completed by the beginning of the third quarter. In some parts of the country, particularly in the Midwest and Northeast, that work did not even hold through the second quarter.

Despite what pre-contracted work there was for the crushed stone industry in the first two quarters of 1980, NCSA's survey of producers in different parts of the country consistently indicates that production volume will be down 12% or more in 1980. Some producers in the Midwest see drops in volume of more than 30%. Producers in New England seem to be facing state and local governments that simply do not have any money. Again, the most frightening aspect of such sharp drops in volume is to be seen in the consecutive-year trends. For insance, 1973 was at that time a record production year for the stone industry. Even so, from 1973 to the end of the 1974-1975 recession, production fell off 14.8%.

To the surprise of many, including producers and the U.S. Bureau of Mines, 1979 turned out to be an all-time record production year. So now, with the prime interest rate having risen to 20%, it should not be surprising to see production volume drop to the 900 million ton level by the end of



Between 1940 and 1973, the price of stone increases negligibly, at an indexed rate of 2.8% per year. Beginning in 1973, the rate of increase is 19.5% per year. Before 1973, productivity gains held the stone rate below the rate of inflation. *(1980 NCSA)*



Since 1973, the rapid escalation in costs for energy—particularly oil products—explosives, and other items has undercut the industry's historic ability to achieve productivity gains. Even so, the rate of increase in the Stone Price Index is still far below that of the Consumer Price Index. *(1980 NCSA)*

1979-1981 period. That would be at least a 15% drop from the peak year to the bottom recession year.

Meanwhile, NCSA's most recent survey shows that operating costs nationwide will average an 8-10% increase in 1980. When the Consumer Price Index rises significantly—a sign of rapid inflation—the industry's production drops off rapidly while dollar value levels off or drops slightly. It's the bottom line that suffers. Return on investment in the aggregates industry will most certainly be down in 1980, 1981, and perhaps the first part of 1982 as a result of the ever-increasing costs of energy and operations and the downturn in sales that has already taken hold. Total dollar sales will be down about 10% according to most producers, although some say more and a few say less.

There are reasons for this situation. Stone prices remained stable between 1940 and 1973 because a dramatic increase in productivity, in combination with a low rate of inflation, resulted in a "real" decrease in the cost of producing stone and hence in the small growth in consumer prices for stone products. For 33 years after 1940, the price per ton of stone increased minimally at an indexed rate of 2.8% per year.

In the last half of the 1970s, inflationary pressures have caught up with the aggregates industry. Government monetary policies, regulations, and intervention have led to a levelling-off of productivity gains and, in fact, to a decrease in productivity per man-hour. This has had the effect of escalating stone prices, particularly in the last 5 to 10 years. In just the 6 years following the 1973 Arab oil embargo, the industry's prices have increased at an indexed rate of 19.5% per year! Nonetheless, stone prices have risen at half the rate of the overall Consumer Price Index. In "real dollars," stone is a better "buy" today than it was 40 years ago.

So what are stone producers doing about the recession? Industry-wide, the time afforded by the recession is being used wisely. Producers are taking the standard measures of laying off least tenured workers, shortening the work week, and eliminating overtime. At the same time, everyone is making productivity his criterion for evaluating operations, planning, and looking into new markets. Filling orders has seldom been a problem for the industry. But now, the importance of aiming at the right markets—ones in which there is demand or new ones in which there is potential—is being recognized and acted on. This too is an essential but often overlooked aspect of productivity. In other words, it is not productive to equip for and stockpile materials for which there is no immediate market; overproduction is not productive, especially when it may mean missing opportunities in other markets.

Streamlining operations by matching the right equipment with the appropriate job and by maintaining equipment has become a priority. For example, having the right number of trucks so that each is fully utilized is another small but important part of overall productivity. More and more producers are now examining computers to see how computer capability can make bookkeeping more efficient and thereby eliminate capital waste and bad debts, to see how computers can be used to monitor and evaluate energy consumption, to schedule start-up of operations efficiently, and to see how minicomputers can be used in management decision-making such as evaluating product lines and market demand, operating costs, and product pricing structures.

There are many seemingly minor components in productivity improvement, so many in fact, that they are frequently overlooked while we strive to find the one big answer to the productivity question. NCSA knows there is no one big question, only questions, and there is no one answer, only many little ideas which, when put to work together, may be able to resolve some of the bigger problems.

Throughout 1980, NCSA's Operations Division has taken the lead in re-focusing the industry's attention on basics: the specific ways by which more stone can be produced, markets penetrated, and return-on-investment increased.

LIMESTONE INDUSTRY HOPEFUL

Robert M. Koch
President
National Limestone Institute

Anyone attempting to prognosticate the year 1981 cannot help but be in trouble right from the word "go." There are two certainties, however—(1) economically, things can't become much worse than in 1980, and (2) for the first time in almost 30 years, business has the opportunity to work more closely with Congress and the Administration to influence new policy and reroute old.

As much as many have been grabbing headlines recently with talk about prayer in schools, abortion, and the like, the key issues of performance for the new government will be in the areas of

the economy and regulatory reform.

1980 taught us that textbook economics is not always necessarily valid; much creativity, sensitivity, and *consistency* will have to go into formulating policies to spur on economic upturns—without the threat of continued inflation. In that regard, a tax cut will be forthcoming in 1981—but not necessarily as large as previous campaign rhetoric would indicate—and much will be done toward freeing business from a tax structure that discourages increased productivity and investment including consideration and likely passage of sub-minimum wage. The key to the nuts-and-bolts features of bettering the economy, however, will be the "perception" left in the minds of the financial, business, and consumer communities. If these sectors can be convinced the worst is over, the upturn will begin and should be strong throughout the remainder of the year. A false start, however, could spook many and cause the independent Federal Reserve to continue tough monetary policies and/or credit controls; this will only aggravate the current slump in construction.

True relief in the regulatory area will not be hard to obtain—if the need is clearly demonstrated and its importance is such that the political bounce-back is judged worth the action. No one should be fooled into thinking that either the Congress or the new Reagan Administration will fall into "knee-jerk" reactions to business requests. Our proposals will have to be well-thought out and defensible as good public policy. If it is for only short-term gains, we can bet that future elections will wipe out whatever opportunities business has in the coming 2 years.

As far as the limestone industry is concerned, topping our regulatory agenda will be MSHA reform legislation. NLI's approach in the past has been the education of Congress to the unworkability of many areas of the Mine Safety and Health Act and the building of a record on which meaningful legislative reform can go forward. NLI will propose several key points to the Congress early in 1981 for amendments to the Mine Act. Even if the 1980 elections had gone a different direction, 1981 still would have been the year of MSHA legislative reform—the elections have simply created a more conducive climate in which to work—particularly in regard to the Senate. The Congress will move early on reform legislation, but final enactment may not come until much later in 1981. But the seeds have been sown, and we believe the entire industry will be rewarded for its past patience, in the face of the extreme adversity of the Act, with changes that not only will get the government off an operator's back, but make a tripartite approach to safety and health-government/operator/employee—possible for the first time.

There will be those who attempt to frustrate the industry's drive for amendments to MSHA, but the record is clear and supports the kind of changes the industry wants made.

Of equal importance to MSHA is the reauthorization and rededication of the federal-aid highway program and its funding mechanism, the Highway Trust Fund. Many fundamental questions will be asked about the program by Congress; the answers they are given will set the program's tone and direction for the next decade. As the Interstate System plods toward completion, emphasis will shift to protecting the "trillion dollar investment" we now have in primary, secondary, rural, and urban systems—the heart of most local and state economies—through rehabilitation, resurfacing, *and* reconstruction. Only by acting now to slow the deterioration of these roads can we be sure that future needs won't completely outstrip future ability to pay. To fund all this, Congress will enact—safely away from any immediate election and after trimming individual and corporate taxes early in the year—an increase in the federal gas tax and key it to future growth as inflation and prices rise.

Although I would expect the federal matching ratio to also rise, the real problem in translating any increased federal funding commitments into increased aggregate *use* in construction will persist i.e. the inability of states to match federal funding. Although the total answer to this problem cannot be provided by the federal government, it is a question we will be asking repeatedly to find at least a partial solution.

Expect a new push for coal use—through making it financially more attractive than imported oil and by amendments to the Clean Air Act (up for reauthorization in 1981) as the environmental pendulum continues to swing back into balance. And with increased coal use, the use of limestone increases as a key tool for air quality (fluidized-bed, low-NO_x burning, and scrubbers). A surge in markets for this use will not happen in 1981, but it will bring the industry a step closer.

The aglime market will depend heavily, as in past years, on the farmer's disposable income and his judgment as to how much to commit to a total soil program. Aglime promotion should continue to hammer home the investment nature of the use of aglime and its availability at reasonable prices. With all the vagaries in weather, government set-asides, and conservation programs, aglime use should continue, nonetheless, in an upward trend as past users become yearly users and they're convinced of the commodity's significant contribution to production and soil conservation.

Prospects for federal reclamation legislation will fade in the face of the National Academy of Science's report and an anti-regulatory-minded Congress. Severe economic threats to the industry for increased water and air quality controls will have to be watched, but are not likely to be seriously considered by Congress.

Generally speaking, people have a good feeling about the coming year, despite continuing storm clouds on the horizon—continued domestic oil decontrol, possible sharp rises in foreign oil prices, and other "outside" pressures that could hinder efforts at home. And this "good feeling" will

create, if bolstered early on by concrete developments, a new climate in the country that is good for business. Limestone is a basic commodity, and, though there may continue to be pockets of the country where use will decline, overall use should continue on the increase. Prices also will increase to meet the ever increasing costs of overhead over the past 5 years and at present. But overall, the industry will continue to rely on smaller local and state projects—particularly where states have budgetary surpluses that can be channeled to construction—and patiently wait for the construction economy to turn around to the kind of growth seen in the late 70s.

GYPSUM INDUSTRY EXPECTS PROGRESS

A. Victor Abnee, Jr.
Executive Vice President
Gypsum Association

Last year at this time, I was more optimistic than many of the contractor groups concerning the health of the construction industry, particularly in relation to housing starts, Time has proved me to be right and that is always most gratifying. I predicted that 1980 housing starts would not fall off nearly as drastically as some people anticipated—that is, to 1 million or even less. As this summary is being prepared, housing starts are only slightly below 1.5 million. I also anticipated that final 1979 figures would show a record gypsum board production of somewhere around 16.5 billion sq. ft. The final figure was a record 16.8 billion sq. ft.

Even with a better than average track record in reading crystal balls, projections, particularly short range projections, do not come easily. Housing starts have been showing great strength up to now in the face of higher mortgage rates; however, the sharply increasing rates of November and December have somewhat tempered industry optimism over the short range. I still do not think the final figure for 1980 housing starts will dip to the 1 million level predicted by others, but I do think the rise in starts during 1981 may be gradual—around 1.6 million, building up to around 2 million a year for the balance of the '80s.

1980 was a different story. Gypsum production was down compared with 1979. It looks now as if production for 1980 will total something over 1[illegible] billion sq. ft. Industry statistics indicate production levels will be about 12% to 15% below last year. March 1980 was the really low point for gypsum. Demand for gypsum wallboard fell substantially. Industry production figures have substantially improved from that point to the present.

Even with that low, however, gypsum use did not drop in direct proportion to reduced housing starts. The reason for this is an increasing use of gypsum in key markets.

Gypsum assemblies continue to be more widely used as lightweight elevator shaft walls, stairwells, and ducts in high rise buildings. Demountable gypsum partitions also are appearing more widely in offices and other commercial buildings. This means that more gypsum assemblies are specified each year in non-housing construction. This trend should continue throughout the 1980s.

I also would expect mobile homes to be an important expanding market for the industry. Gypsum drywall has, for some time, been used around furnaces, water heaters, and kitchen ranges—those areas demanding greater fire resistance. The industry feels fire safety considerations should lead soon to the much wider use of fire resistant gypsum board as interior walls and ceilings. A number of mobile home manufacturers already are producing or planning to produce homes with 100% gypsum drywall interiors.

This should, therefore, become a major gypsum market. With the cost of a home currently averaging $65,855, more people than ever will be drawn into the mobile home market or will be looking at another alternative—renovating older homes.

Remodeling and renovating should be a huge market for the balance of this decade. At the present time it is estimated sales of building products to the do-it-yourself market total $37 billion. More homes, apartments, and commercial buildings are being renovated and remodeled today than at any time in the past; this is a pattern I see continuing for the rest of this decade. These projects will use a variety of gypsum board products and assemblies. These diversified uses of gypsum products explain why our industry is not totally dependent on the housing curve.

Another important factor to be considered, when looking at the immediate future of construction, is the significant difference between the recession of 1974-75 and the slump of 1980. This time building contractors were smarter; they were not caught with a substantial inventory on their hands. When the upturn began after the 1974-75 recession, these inventories had to be depleted before new construction could be marketed. This does not appear to have happened in the aftermath of the 1980 recession.

Although generally optimistic

for the long range, I must point out again that, as this paper is being prepared, housing sales and permits are dropping, a fact that will temporarily bring down housing starts.

But, in the long-run, we find encouragement in the assessment of the Federal National Mortgage Association (Fannie Mae): "Regardless of whether money is tight or easy, interest rates high or low, the demand for home financing will be increasing. The babies born during the post-war boom are ready for places of their own. Nearly 32 million Americans reached 30 years of age during the '70s. During the '80s, 42 million will reach the prime buying age."

This analysis goes on to say, "Additional demands for mortgage funds will come from some new buyers in the housing market, women who head households, the elderly, and single people, for examples. Minorities who had found opportunities scarce or nonexistent now have the protection of the law to help them enjoy home ownership."

George A. Christie, chief economist for McGraw-Hill Information Systems Co., sums the situation up when he says, "Together, the combination of pent-up demand, a tight housing supply, and considerably improved mortgage market operations suggest an even more vigorous housing recovery in 1981 than in 1976." However, he is quick to point out that continued inflation could impose formidable limits on this expansion since it has a two-fold negative effect in the form of higher building costs and higher credit costs.

For the gypsum industry, I can say that industry production capability is now at an all-time high, resulting undoubtedly from the fact that the industry anticipates some record production years during the balance of the 80s.

SLAG INDUSTRY HOPEFUL ABOUT '81

H. K. Eggleston
Managing Director
National Slag Association

The slag industry is optimistic for 1981 due to two factors: 1, an increase (over 1980) in steel production, the source of slag; and 2, increased use of improved processing equipment and techniques which should increase the volumes of slag used for several specialized purposes.

The production of iron and steel is critical to the slag industry because most of the reserves of "old" slag have been exhausted. The slag industry is directly dependent upon the steel industry for its raw material. Steel production was relatively low in 1980 but the prospects for 1981 are good—no changes in iron and steel production techniques which will affect the percent of slag per ton of hot metal are expected.

However, the principal reason for optimism results from developments in processing techniques and the potential of steel industry slag for reducing energy requirements.

Several years ago, a device was developed which could expand liquid slag as it flowed from the blast furnace to produce a lightweight aggregate. Continued use of this equipment has resulted in improvements which now permit the production of material suitable for several high quality uses.

One of these, with great potential for energy conservation, is the use of blast furnace slag as a substitute for portland cement, eliminating the use of energy to create the clinker needed for portland cement. Slag has been used for this purpose for many years in Europe, Japan, South Africa, and the Communist countries providing proof of the reliability of slag for this purpose; but use of slag as a cementitious material has not been a common practice in the United States.

Water-granulated (large volumes of water to quickly quench the slag) has been a generally accepted method for producing a slag with suitable characteristics for cement. It requires a high capital investment. The ability of the new processing device to mechanically break up molten slag into small particles permits the required rapid quenching of the slag with smaller volumes of water and smaller capital investment. Thus, there are two options for producing slag for cement, and this, combined with the energy saving from eliminating the kiln calcining of clinker, should result in a much greater use of slag for cement in the coming years.

The increased flexibility of expanding devices also permits the production of lightweight aggregate for a variety of construction purposes—from use in concrete to lightweight base material in poor soil conditions. Included in this range are substitutes for expanded clays or shales which require large expenditures of expensive energy.

Steel and blast furnace slags continue to demonstrate in actual use that they can provide long-lived high skid resistance for highway resurfacing. It is anticipated that there will be an increase in the number of instances where slag will be required for this purpose.

Thus, even though there will only be a modest increase in the availability of slag, there should be a significant increase in the sophistication of uses made of steel industry slags.

LIGHTWEIGHT AGGREGATE REFLECTS RESIDENTIAL CONSTRUCTION

T. R. Berger
Executive Director
Lightweight Aggregate Producers Association

For lightweight aggregate, 1980 proved to be a year of stable but not spectacular sales volume. The year began on a fairly upbeat note but softened in the third and fourth quarters as construction activity slackened due to continuing inflationary pressures, an uncertain economy, and higher money costs.

Close to 90% of all lightweight aggregate production is going into the manufacture of masonry units so any downturn in residential construction has an adverse effect. Activity in this category was slower than in industrial and commercial building. Specialized uses of lightweight aggregate—as an admixture for potting soils and other applications in agronomy, or for running tracks—are thriving. Nevertheless, the fundamental market for our product is masonry units, precast and prestress concrete, structural concrete, refractory concrete, et al. And 1980 was not an exceptionally busy year in most geographical areas of the nation in these industries.

The cost of producing lightweight aggregate is tied closely to the spiraling expenses of fuel, equipment replacement, maintenance, and—not the least of all—environmental controls. There has been less attrition in the number of lightweight aggregate plants, but, in many sections of the country, the demand simply cannot be met because production facilities have suspended or closed out altogether under the hammer blows of uncontrolled inflation and complex, costly environmental regulation.

Despite this, several producers are expanding or are planning to enlarge production facilities, albeit with some misgivings about the wisdom of their increased capital investment. Such confidence and courage is to be commended. This commitment demonstrates their strong feelings that the place of lightweight aggregate in today's times and in the future is assured.

One of the significant indicators that holds great promise for a brighter tomorrow is the key role lightweight aggregates are fulfilling with respect to new energy saving construction techniques and building code requirements set forth by HUD and other regulatory agencies. For example, lightweight aggregate is ideally adapted to the standards specified in new construction concerning insulation. It also is finding favor with architects and builders in its application to the concrete construction of underground housing, particularly with respect to condensation and moisture effects and the development of designs to cover these factors efficiently.

The industry looks at 1981 with cautious optimism. If there is an upsurge in the health and vitality of the construction industry and the general economy, lightweight aggregate will benefit. It's that simple.

EXPANDED SHALE IMPROVES EFFICIENCY

Harry C. Robinson
Managing Director
Expanded Shale Clay and Slate Institute

Expanded shale clay and slate by the rotary kiln process is used in all phases of construction as well as for a few very unusual special uses. Approximately 65% is used in the manufacture of concrete masonry units; 20% is used in the structural field—ready mixed, precast and prestressed concrete; 10% is used in flexible pavement; and 5% goes for special uses.

Due to high interest rates, inflation, and the general recession, the expanded shale industry has felt an approximate 18% decline for 1980. Even though this reduction hurts the overall operation of the industry, producers have still been very conscious of improving production efficiency in order to hold down energy costs.

Industry members are hopeful that the new administration taking office in January will bolster confidence in the economy in 1981. The continued high interest rate will keep housing starts down in the first quarter but we look for an up-turn as spring breaks.

Efficient use of energy will

continue to be most important to everyone. The solar home will not be the home of the future but the home of today. Heating homes and businesses with passive solar energy will become more popular and this is where our industry will make a strong contribution. Lightweight concrete and masonry are excellent passive solar energy collectors and will give an efficient but low cost solar home or industrial building. This will trigger more use of concrete and masonry, therefore more use of lightweight aggregate. The overall use of lightweight concrete and masonry also will help reduce the cost of energy use. ESCSI members predict that we will gain back that 18% decline in 1981. With extra promotional effort, we may even go another few percentage points beyond that.

LIME TAKES A NOSE DIVE IN 1980

Kenneth A. Gutschick
Vice President & Technical Director
National Lime Association

After 4 years of steady growth, including records set during the last 2 years, commercial lime (quick & hydrate) plunged drastically in 1980, dropping an estimated 11% below 1979. The decline was even greater during the first 9 months—off 13% from the comparable period in 1979, but an upturn in the last quarter should bring yearly sales to 12.7 million tons. This will be the lowest since 1975, the country's previous recession year.

Captive lime and dead-burned dolomite, which are included in the U.S. Bureau of Mines' Survey on lime, also declined in 1980, but at slightly higher percentages than commercial lime. Accordingly, it is expected that total lime output in 1980 will approximate 18.2 million tons, off 13% from last year. Apparent lime consumption in the United States, which includes U.S. output plus imports minus exports, should total only 18.8 million tons, or 14% below 1979. The reason for the greater percentage decline is that imports (chiefly from Canada) are expected to drop 30% from last year's record high of 640,000 tons, while exports will remain at about the 45,000 ton level.

The principal reason for the depressed lime market in 1980 can be traced directly to the sagging automobile and housing industries which caused the steel industry to have its worst year since 1975 (second lowest since 1971). For the first three quarters, production of raw steel, which accounts for nearly 45% of total lime output, was off a gigantic 22% from last year, with the steel mills operating at an unbelievably low rate of 50% of capacity during part of the summer months. This poor performance by steel resulted in a 27% decline in fluxing lime sales for the first three quarters.

The depressed construction market, particularly housing, naturally affected sales of building lime (masons and finishing) which were down 11% through September. On the bright side, however, stabilization lime shipments were up 8%, undoubtedly due to brisk construction activity in the Sun Belt states, particularly Texas, where lime stabilization has become a standard construction practice in the highly plastic clay areas. There also is renewed interest for lime in maintenance, particularly for stabilizing worn-out pavements where in-place materials are salvaged, with only a small percentage of lime being needed for stabilization.

The remaining major lime uses—chemical and environmental—were about the same as in 1979 with gains in treatment of water, sewage and industrial wastes, and scrubbing SO_2 from stack gases, offsetting losses in lime manufacture of glass, aluminum, copper, pulp and paper, etc. The scrubbing market has recently become a major use with sales exceeding 600,000 tons in 1979, probably higher this year.

Lime shipments fluctuated considerably in 1980. During the first 4 months, sales closely paralleled the previous record year of 1979. But in May, output plunged drastically, with the summer months falling to 5-year lows. In September, however, the upturn began (up 6% over August), and is continuing into the fourth quarter.

In 1981, we expect a much improved year for lime, particularly during the second half; we anticipate a gain of perhaps 8-10%. The new Reagan administration should provide a much needed shot-in-the-arm for business and industry, principally by providing a better business climate (less government regulations, reduced inflation, greater incentives for plant expansion and modernization, greater opportunities for increased productivity, etc.). The main deterrent, however, at least initially, is the rising prime lending rate, which is temporarily slowing recovery from the 1980 recession. Rapidly rising interest rates are curtailing purchases of automobiles, housing, and other major items, as well as causing delays in much needed expansion of plant facilities. This trend must be reversed soon or the recession will continue on into late 1981.

Aggregates, other major nonmetals

Cloudy 1980 picture brightens for 1981

BY SANDY HEROD
and
SID LEVINE

Information presented in the following section on the sand and gravel, crushed stone, and lightweight aggregate industries is based on data submitted in response to our annual PIT & QUARRY survey of producers of those commodities. The canvass has been conducted during the final quarter of each year since 1955.

Production levels have been reviewed regularly, but, through the years, questions have been added relative to pricing levels, certain cost centers, and regulatory factors in order to also establish patterns, trends, and impact on the industries of these factors.

The survey questionnaire also asks producers about their business prospects and any plans they may have for new plants, equipment replacement, or expansion projects. Their responses provide a solid base from which the outlook for the coming year may be studied.

Data derived in tabulating and recapping the information submitted are summarized in an accompanying table. Since these surveys are conducted early in the fourth quarter, producers are asked to make full-year estimates for some factors.

Information provided by each individual is kept confidential; the data are incorporated in the tabulation of the total response by region. On some questions, weighted national averages are established.

In preceding pages of our outlook and review, industry production figures provided by national associations will be higher than those indicated in this section. This is because we survey only *aggregate* producers for this part of our review; we do not include tonnage of crushed stone, sand and gravel, etc. used in cement and lime manufacture, agricultural material, glass manufacture, foundries, and similar customer industries.

At this time last year, our projection of survey data pointed to a further increase in aggregate production during 1979 over the 1978 level. Our latest survey, and the most recent government commodity reports, indicate a gain in the total of all aggregates produced although a slight drop was recorded in one category.

The combined production (aggregates only) of sand and gravel, crushed stone, and slag (exclusive of expanded slag) totalled slightly more than 1.8 billion tons or about 1% above 1978. The sand and gravel and slag tonnage portions of the total were down slightly from the preceding year, but crushed stone showed a gain of nearly 5%.

Lightweight aggregate tonnage was down to 12.6 million tons from the 13.3 million produced in 1978. This reflects shutdowns and other production interruptions arising from the problems a substantial number of the lightweight producers—particularly in the case of expanded clay and shale and expanded slag—have faced in at-

Summary of Pit & Quarry's 1980 Aggregate Survey

	Sand & Gravel	Crushed Stone	Lightweight Aggregate
Review of 1980			
Product (+ or − vs. 1979)	− 6%	− 2%	− 3%
Prices			
raised (% of replies)	88%	72%	87%
avg. % raised (weighted)	8%	10%	11%
Wages			
raised (% of replies)	92%	87%	83%
avg. % raised (weighted)	12%	9%	11%
Maintenance costs			
up (% of replies)	85%	81%	78%
avg. % of increase (weighted)	15%	16%	17%
Outlook for 1981			
Expect gain (% of replies)	50%	31%	61%
avg. gain expected (weighted)	+11%	+16%	+12%
Expect decrease (% of replies)	10%	19%	4%
avg. drop expected (weighted)	− 9%	−19%	−10%
No change (% of replies)	22%	37%	22%
Unsure (% of replies)	14%	9%	9%
Plans reported (% of replies)			
New plants	12%	12%	8%
Equipment replacement	22%	25%	17%
Plant expansion	14%	15%	13%

This table summarizes various major factors reviewed in Pit & Quarry's annual survey of aggregate producers excepting slag which is discussed in an accompanying association commentary. As applicable, the figures indicate percent of change.

tempting to conform with air quality control standards.

The data provided by respondents to our latest survey point to a drop in sand and gravel output during 1980 and a level of crushed stone production about the same, or slightly lower, than in the preceding year. Iron and steel slag material (not expanded) also was down. However, of standard weight aggregates, combined production appears to have been only about 5% lower than in 1979. As a group, lightweight materials apparently continued the decline, first appearing in 1979, and were down on the order of 6%.

In recapping our latest survey, we arrive at an estimated production of sand and gravel aggregates in 1980 of 945 million tons, an output of crushed stone remaining at the 860 million ton level, a slag processing rate of 33 million tons, and a combined output of all types of lightweight aggregates of about 12.2 million tons.

With respect to prospects for the coming year, a substantially larger number of respondents to our latest survey were optimistic about business in 1981 than was the case, relative to 1980, a year ago. Interestingly, as the table shows, lightweight aggregate producers were in the vanguard of the optimists.

Immediately following the review and outlook data compiled from our survey of sand and gravel, crushed stone, and lightweight aggregates are the latest figures available (1979 and partial 1980) on other major nonmetallic industries. Included are lime, agstone, gypsum, phosphate rock, potash, barite, talc, feldspar, and fluorspar.

Sand and gravel

The growth projected for the full year of 1979 by respondents to our survey a year ago overshot the mark by a small percentage. According to the final Bureau of Mines Mineral Industry report for that year, the total tonnage of construction aggregates for 1979 was about 945.5 million tons, valued at some $2.1 billion—a drop of 2% in volume but a 5% gain in value.

Our latest survey indicates that, at best, production did not decline precipitately; final data for the year probably will show an output on the order of 900 million tons.

However, optimism for the coming year is evident in the fact that 50% of our respondents look for considerable improvement. Their numbers are 25% higher than was the case a year ago.

There are no surprises found in the producers' replies to questions concerning certain operating expenses. As shown in the summary table, the weighted national average increase in wage costs for each industry was substantial. The 12% climb reported by sand and gravel producers is nearly one-third higher than in the preceding year.

Further, maintenance costs continue to climb each year. The 15% national average increase in 1980 is about the same rate of gain reported a year ago. Parts availability, aside from rising costs of these components, is one of the most frequently cited problems.

In the face of appreciable increases in both of the above major cost centers, we find that, while the majority of respondents raised prices of their products again last year, the increases were at a much lower rate. The weighted national average of 8% was from 30 to 50% less than the climbs in wage and maintenance expenses.

Outlook

Nearly 25% more respondents look for an upturn in their business during 1981 than were in the optimistic group a year ago. Fully one-half hold that opinion; the average increase expected (weighted nationally) is 11%.

Further, another 22% of our replies (nearly one-half of the remainder of the respondents) indicate the feeling that the coming year will hold at the same level as the 12 month period just past. Just 10% of the replies pointed to a decline.

Considering the projected picture for construction, described elsewhere in this outlook and review section, we feel the industry will record a slow climb during the coming year, perhaps reaching the level of nearly 940 million tons.

Crushed stone

Last January, in reporting on our survey covering 1979, we predicted a production volume of crushed stone aggregates on the order of 859 million tons. At 858 million tons, valued at $2.5 billion, final Bureau of Mines figures corroborate the estimate made on the basis of returns from our survey.

During 1980, according to the full-year estimates supplied by respondents to our latest canvass, output remained at apparently the same level. If final figures show a decline, it very probably will be of less than 2%.

With respect to the coming year, we find that about one-third of the answering producers look for an upward turn; a slightly larger number feel that production will remain at the 1980 level.

The major cost centers of wages and maintenance continued steep climbs in 1980; respective increases of 9% and 16% are virtually the same as reported for 1979.

While a number of various maintenance problem areas were cited on questionnaires returned, ranging from bearings to poor performance of maintenance personnel, far and away the most frequently noted problems concerned parts availability (and service) and crushers (primarily wear components).

Our survey respondents also reported boosts in their prices. The weighted national average increase of 10% was identical to that indicated for 1979. However, it was less than the percent of increase in maintenance costs and was about equal to that of labor costs.

Outlook

As noted earlier, and indicated in the summary table, just over two-thirds of the crushed stone survey replies indicate anticipated increases in business during 1981 or at least the same level reported for 1980. A decline during 1981 is anticipated by 19% of their colleagues. This group is

only slightly smaller than that which held a similar opinion a year ago with respect to 1980. However, they look for a sharper (19%) decline.

Considering the relationship of prime rates and inflation to construction activity, it would not be realistic to expect a surge in the industry's output during the coming months. However, the projected gain of about 3-4% in physical volume of construction could readily result in an output of about 865 million tons of crushed stone aggregates in 1981.

Lightweight aggregates

The estimates of full-year production in 1979 supplied to us by our respondents a year ago pointed to a nominal increase of less than 1% in output over the previous year.

However, the final government figures for 1979 reflect a decline of 6% in the combined production of expanded clay, shale, and slate; of pumice, expanded slag, expanded perlite and exfoliated vermiculite. The total was 12.5 million tons.

Our 1980 survey returns report a continued decline last year, although at an average of 3% for all lightweights combined, the drop was at a lower rate than the preceding year; estimated production was about 12.2 million tons.

The problems faced by producers of this type of aggregate—the cost and availability of fuel involved in processing of most, along with the expense of equipment and downtime experienced in programs set up to meet air quality regulations—has been cited in survey reports of recent years.

As a group, the lightweight aggregates show cost center trends that are within one or two percentage points of those displayed in the standard weight aggregate industries. Also the rates of increase in cost elements, as well as pricing, are virtually identical to those reported a year ago for 1979 (see summary table).

Outlook

While lightweight producers have had problems that, along with the current economic situation, understandably could generate considerable pessimism, they, nevertheless, have taken the opposite position in greater numbers than standard weight aggregate producers.

In fact, the number of respondents anticipating an upturn in their business this year is nearly double that of a year ago. Almost two-thirds look for a turnabout, nearly one-quarter feel conditions will not deteriorate further, and, together, they far outnumber the 4% of respondents who feel the decline will continue in 1981.

The optimism is refreshing, but probably needs a little tempering in light of still unresolved inflation and prime rate factors. Accordingly, we feel that, while an improvement over last year is probable, the rate will be lower than the producers project and will result in production in the neighborhood of 12.6 million tons during 1981.

Agstone

According to the latest figures available, obtained in a state-by-state survey by a national industry association, application of agricultural limestone in 1979 rose to 30.1 million tons, an increase of about 1% over 1978. That made the fifth consecutive year that agstone usage on the nation's farms and other soil conservation projects was at a level above 30 million tons.

That figure still represents less than one-third of the annual tonnage needed, as determined by agronomists. Missouri farms used 4 million tons in 1979, and applications in Illinois amounted to 3.5 million--these two leading consumer states accounting for about 25% of the total tonnage used in the 42 states surveyed.

Lime

Lime output by U.S. producers totaled 20.9 million short tons valued at $862.4 million in 1979 and 20.4 millon tons valued at $749.6 million in 1978. Puerto Rico provided an additional 41,000 tons with a value of $3.2 million in 1979 and 37,000 tons with a value of $3.3 million in 1978. Preliminary data for lime sold or used by U.S. and Puerto Rican producers in 1980 give an estimate of 18.1 million tons. The record output was 21.6 million tons in 1974.

By lime type, production percentages in 1979 were: quicklime, 83.8%; hydrated lime, 12.4%; dead-burned dolomite, 3.8%. By use groups in 1979, agriculture accounted for .34% ($3.2 million value); construction, 6.4% ($62.8 million value); chemical and industrial applications, 89.4% ($757.9 million value); refractory dolomite, 3.7% ($41.6 million value).

A total of 485 kilns were operational during 1979: 248 vertical kilns; 181 rotary kilns; 27 pot kilns (primitive vertical); six fluidized-bed kilns; four Ellernan kilns; one traveling-grate rotary kiln. Hydrators for the production of hydrate lime totaled 118 during 1979; 23 were of the batch type and 95 were of the continuous type.

Gypsum

In 1979, 42 companies mined crude gypsum at 65 mines in 22 states for a total of 14.6 million short tons valued at $99.8 million. Output decreased 2% compared with the record year of 1978. Imports of crude gypsum increased 17% in 1978 to a record 8.3 million tons, but decreased 6% in 1979 to 7.8 million tons.

Production of calcined gypsum increased 12% to 14 million tons (value, $387 million) in 1978. An increase of 4% in 1979 set a new annual record of 14.6 million tons ($442.1 million). Sales of gypsum products in 1978 amounted to 21.6 million tons (value, $1.25 billion) and 21.8 million tons (value, $1.39 billion) in 1979.

Of the total gypsum products sold or used in 1979, 5.8 million tons (37%) were uncalcined. Of the total uncalcined gypsum, 4 million tons (69%) were used for portland cement, 1.7 million tons (29%) for agriculture, and the remaining 2% for fillers and miscellaneous uses.

Of the total calcined gypsum in 1979, 95% was used for prefabricated products and 5% for industrial and building plasters. Of the prefabricated products, 75% was regular wallboard, 19% was fire-

resistant Type X wallboard, 3% was veneer base, and sheathing and predecorated wallboard were 1% each. Demand for gypsum is expeted to increase at an annual rate of about 2.7% through 1985.

Phosphate rock

Mine production of phosphate rock in the United States amounted to 173.4 million metric tons in 1978 and 185.7 million metric tons in 1979. Record tonnages of 50 and 51.6 million metric tons of marketable phosphate rock were produced in 1978 and 1979, respectively. Values of marketable production were $928.8 million in 1978 and $1,045.66 million in 1979.

In 1978, Florida and North Carolina produced 87% of the total marketable phosphate rock; the western states produced 10%; Tennessee produced 3%. In 1979, Florida and North Carolina produced 86%; the western states, 11%; Tennessee, 3%.

The principal domestic markets for phosphate rock in 1979 were: fertilizers and animal feed supplements, 88%; and industrial and food grade products, 12%. Uses of the 38.7 million metric tons of marketable phosphate sold or used domestically in 1979 by U.S. producers were: wet process phosphoric acid, 81.8%; normal superphosphate, .8%; triple superphosphate, 4.3%; defluorinated rock, .6%; direct applications, .1%; elemental phosphorus, 11.8%; ferrophosphorus, .6%.

Potash

U.S. potash production in 1979 amounted to 4.2 million metric tons (2.2 million metric tons K_2O equivalent). Imports for consumption in 1979 totaled 8.51 million metric tons (5.17 million metric tons K_2O equivalent), valued at $520.8 million. Exports amounted to 1.12 million metric tons (.635 million metric tons K_2O equivalent), valued at $79.5 million.

Apparent consumption in 1979 totaled 11.9 million metric tons (6.9 million metric tons K_2O equivalent). Sales by producers in 1979 amounted to 4.55 million metric tons (2.39 million metric tons K_2O equivalent), valued at $279.2 million.

In 1979, 82% of all production was potassium chloride and 9% was potassium sulfate. The remaining were manure salts and potassium magnesium sulfate. New Mexico accounted for 84% of total domestic production in 1979.

Barite

U.S. mine production of barite ($BaSO_4$) sold or used amounted to 2 million short tons (valued at $51.75 million) in 1979, about 4% less than the 1978 record. Imports totaled a record 1.49 million tons (valued at $64.07 million), and exports were 109 million tons (valued at $10.8 million).

Total ground and crushed barite sold or used by producers reached a record 3 million tons (valued at $168.1 million), 12% higher than the previous record set in 1978. The principal use for barite, as a weighting agent in oil- and gas-well drilling muds, accounted for 94% of total sales, or 2.84 million tons. Other uses include barium chemicals and fillers.

Nevada is the leading producing state with 85% of total production. Other producing states (in descending order of production) were Arkansas, Missouri, Georgia, Montana, Illinois, Tennessee, and New Mexico.

Feldspar

Feldspar production amounted to 740,000 short tons, valued at $21.5 million in 1979. Seven states produced feldspar in 1979, including North Carolina, California, Oklahoma, and South Dakota.

Imports for consumption in 1979 amounted to 266 tons valued at $31,000, and exports totaled 12.3 tons with a value of $1 million. End-use distribution in 1979 was 55% for glassmaking, 42% for pottery, and 3% for such applications as enamels, soaps, sanitary ware, etc.

Fluorspar

U.S. fluorspar production segments for 1979 were: mine production, 407,054 short tons; material beneficiated, 355,655 tons; material recovered, 106,099 tons; finished shipments, 109,299 tons (valued at $12.16 million). Illinois was the leading producing state in 1979 accounting for almost 90% of all U.S. shipments.

Imports for consumption amounted to 1.02 million tons, valued at $80.1 million. The United States depended on imports to supply more than 85% of its fluorspar requirements in 1979. End-uses of the reported 1.136 million tons were: hydrofluoric acid, 51.8%; glass and fiberglass, 1%; enamel and pottery, .1%; welding rod coatings, .1%; primary aluminum and magnesium, .1%; iron and steel castings, 1%; open hearth furnaces, 7.9%; basic oxygen furnaces, 29.7%; electric furnaces, 7.9%; other uses, .5%.

Talc

Crude talc mined in the United States in 1979 amounted to 1.2 million short tons, valued at $19.3 million. Crude and processed talc sold by producers totaled 1.119 million tons, valued at $80.53 million.

Imports for consumption amounted to 22,000 tons, valued at $2.8 million and exports totaled 316,000 tons, valued at $15.2 million. Talc was produced at 36 mines in 12 states in 1979.

End-uses for ground talc in 1979 were: ceramics, 27.1%; cosmetics, 7.7%; insecticides, 1.4%; paint, 24.7%; paper, 10.9%; plastics, 11.7%; refractories, .6%; roofing, 2%; rubber, 4.1%; other uses, 9.8%. ●

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The international cement scene

Plant and production update: 1981

BY SID LEVINE

World cement production for 1979 is estimated at 860.5 million metric tons, just slightly higher than the 1978 record level. Although construction activity shows a diversified pattern geographically, the world economic trend indicates a drop-off in cement consumption for 1980.

Total 1979 production in the 19 country-members of the European Cement Association (CEMBUREAU) amounted to 212.7 million metric tons—a decline of about .7% over 1978. For the first time, cement production declined in the Soviet Union; output fell from 129.3 million to 123 million tons. Top exporters among the CEMBUREAU countries in 1979 were: Spain, 8.7 mmt; Greece, 4.9 mmt; France, 2.8 mmt; Great Britain, 1.4 mmt.

Leading Cement Producing Countries

(In million metric tons)

	Production	Total cement capacity (est.)	
	1978	1979	1980
U.S.S.R.	129.3	140.	N.A.
Japan	84.4	109.	N.A.
United States	72.5	91.5	95.
China	68.	N.A.	N.A.
Italy	38.5	50.	N.A.
Germany (West)	33.	35.	35.
Spain	32.1	39.9	44.
France	31.2	36.6	36.9
Brazil	23.2	27.	30.
Poland	21.7	N.A.	N.A.
India	19.6	22.8	26.5
United Kingdom	16.6	19.6	19.4
Korea (South)	15.5	20.3	23.3
Turkey	15.4	18.7	19.6
Mexico	15.3	16.9	19.5
Romania	14.	N.A.	N.A.

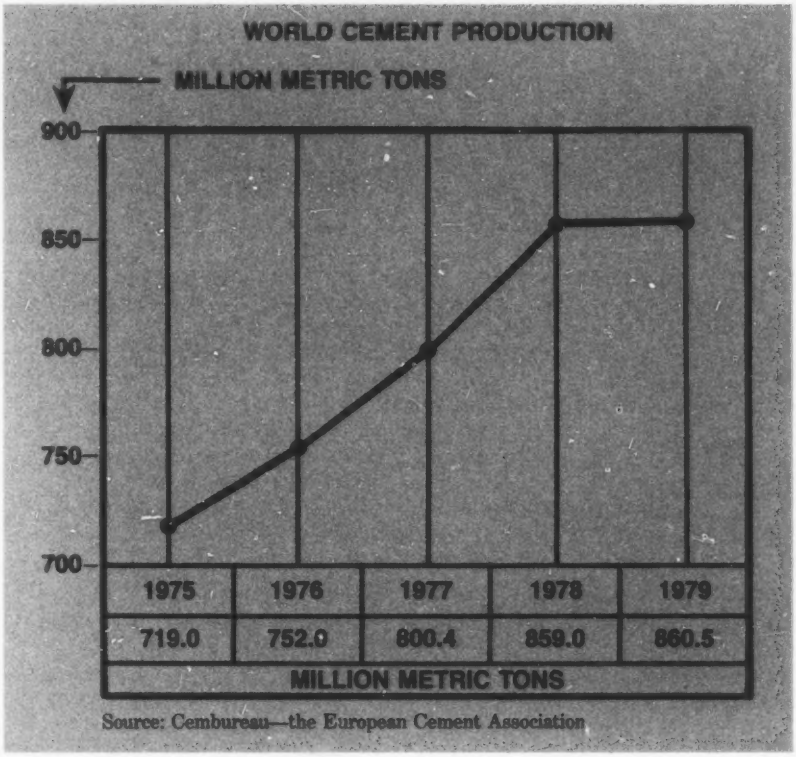
Sources: CEMBUREAU publications; "Mineral Commodity Summaries, 1980", U.S. Bureau of Mines; Pit & Quarry estimates.

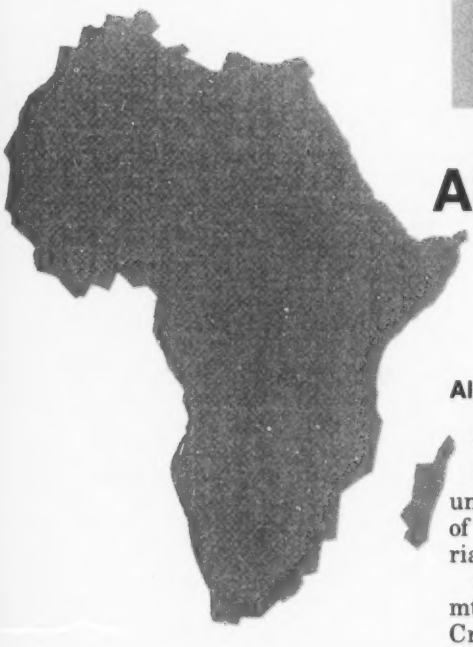
New cement production units continue to be planned and built. In this annual survey, Pit & Quarry provides projected operational dates for new cement plants and plant modernizations and extensions, and lists projects placed onstream in 1979 and 1980. Where data were available, production quantities for the 1976-1978 period and estimated cement capacities for 1979 and 1980 are listed for the various countries.

In July of 1980, the Mexican government announced expansion plans of its cement industry. The federal government's goal is to meet Mexico's domestic needs plus provide a 10% surplus for export. This would increase cement production 13.1 million metric tons in the 1980-1983 period.

In its 1979 annual report, Polysius has noted that cement plant production supply continues to exceed demand. The situation, the company says, is aggravated by the entrance of new suppliers into the market and by the fact that, in western Europe, engineering firms oriented toward serving the domestic market are having to find work from abroad to maintain employment.

The cost of energy continues to be a major problem for the cement industry. Polysius, in the same report, said this energy market has led to an exceptional level of business in the conversion of plants to coal use.





AFRICA

Algeria

Cement production			Capacity	
1976	1977	1978	1979	1980
1.321	1.820	2.699	4.7	5.4

Quantities in million metric tons

Cement plants are state-owned under departmental jurisdiction of Societe Nationale des Materiaux de Construction.

• Beni-Saf. Capacity: 1 million mtpy. Major equipment supplier: Creusot-Loire Entreprises. Dry process plant with 1,200 tph crusher; 270 tph raw mill; two 90 tph finish mills; 18 ft. × 300 ft. rotary kiln. SNMC contract. Process control equipment: Comsip (France). Consulting engineers: Prospective Engineering Gestion. Scheduled onstream: 1979.

• Bouira. F. L. Smidth & Co., Denmark, and F. L. Smidth & Cie., France, will supply a turnkey cement plant with a 1 million tpy capacity. The plant will be located near Sour-El-Grhozlane in the Bouira district, about 140 km southeast of Algiers. Scheduled operation: 1983.

• El Asnam (250 km from Algiers). Capacity: 1 million mtpy. Onstream: 1979. Dry process, suspension preheater, computer controlled. Major equipment suppliers: Kawasaki Heavy Industries, Ltd. and Marubeni Corp. SNMC contract.

• Hamma-Bouziane (Constantine). Capacity: 1 million mtpy. Major equipment supplier:

Creusot-Loire Entreprises. Scheduled onstream: 1980.

• Saida (Oran). Capacity: 500,000 mtpy. Onstream: 1979. Dry process (preheater kiln). Major equipment supplier: Kawasaki Heavy Industries, Ltd. Consulting engineers: Lafarge Conseils et Etudes.

Angola

Cement production			Capacity	
1976	1977	1978	1979	1980
.150	.150	.170	1	1

Benin

Cement production			Capacity	
1976	1977	1978	1979	1980
.170	.170	.230	.4	.6

• Societe des Ciments d'Onigbolo: Onigbolo. Two neighboring West African states, the People's Republic of Benin and the Federal Republic of Nigeria, have jointly awarded F. L. Smidth & Co. A/S a contract for the construction of a cement plant with a capacity of 500,000 tpy.

The dry process plant will include a Tirax raw mill, 4.6m × 8.25m, with a 4.4m drying chamber, a 1,600 tpd oil-fired four stage preheater Unax kiln, 4.55 × 68m, and a Unidan cement mill, 3.8m × 12m. The project is under construction with completion expected in 1982.

• Societe Nationale des Ciments (SONACI): Cotonou: 200,000 mtpy open-circuit grinding plant scheduled onstream in 1979. Consulting engineers: Prospective Engineering Gestion. Main equipment supplier: Koch (Germany).

Cameroun

Cement production			Capacity	
1976	1977	1978	1979	1980
.303	.405	.417	.545	.570

• Cimenteries du Cameroun: Figuil. Expanding from 70,000 tpy to 100,000 tpy. Scheduled onstream in 1982.

• Cimenteries du Cameroun: Douala. Raising production capacity at the Bonaberi clinker crushing works from 480,000 to 870,000 tpy. Scheduled onstream: 1983.

Central African Republic

Cement production			Capacity	
1976	1977	1978	1979	1980
—	—	—	.12	.12

• Fatima (near Bangui). Projected 120,000 tpy plant.

Congo Republic

Cement production			Capacity	
1976	1977	1978	1979	1980
.045	.045	.060	.080	—

• The Congolese government is modernizing and expanding its existing Cidolou operations from 80,000 to 120,000 tpy. Project due for completion in 1983. Prospective Engineering Gestion (Switzerland) is acting as consultant and project manager.

Egypt, Arab Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
3.362	3.170	3.040	3.655	4.090

• Tourah Portland Cement Co.: Lecaire (Tourah). Adding 2,000 mtpd F. L. Smidth dry-process kiln equipped with cyclone preheater and a precalciner. Scheduled onstream: 1981.

• National Company for the Production of Cement: El-Tabbin (30 km south of Cairo). Adding 4,500 tpd production line. Major equipment suppliers are Humboldt Wedag and CGEE Alsthon S.A. Clinker will be produced in a 76m long × 5m diameter rotary kiln with a twin-type preheater and an additional in-line firing arrangement. Scheduled onstream: 1979. Dyckerhoff Zementwerke will supply consulting services.

• Alexandria Portland Cement Co. (Alexandria). Expansion, due onstream in 1979.

• Suez Cement Co., Eastern plant, south of Suez City: Building new 1 million mtpy plant. Fuller Co. supplying equipment, including 15 ft. × 42 ft. raw mill; SF-141 preheater with flash calciner; 15 ft. × 16 ft. × 240 ft. rotary kiln; two 15 ft. × 46 ft. finish mills; grate clinker cooler; blending and raw storage silos; Fuller-Kinyon systems; dust collectors; fluidizing gravity conveying systems. Ferguson International Co. is project manager and consultant. Participating are: Arab Consulting Engineers; Arab Swiss Engineering Co.; Bendy Engineering Co. (process review); Morrison-Knudsen (quarry, plant, and development); H. K. Ferguson, San Francisco Division (coordination of U.S. subcontractors, purchasing, expediting, construction estimate, and portion of engineering). Scheduled onstream: 1982.

• Suez Cement Co.: Second plant to be built in Quattamia (formerly East Maadi). Capacity: 1.4 million mtpy. Ferguson International Co. is the project manager and consultant. Participating are: Arab Swiss Engineering Co.; Bendy Engineering Co.; Arab Consulting Engineers; Morrison-Knudsen.

• Helwan Portland Cement Co. (Helwan): Consortium formed by F. L. Smidth & Co. (Denmark) and Brown, Boveri & Co. (Switzerland) awarded contract by company to convert two existing wet process production lines to dry process. Both lines will incorporate F. L. Smidth precalcining systems with four-stage preheater kilns. Capacity: 3 million mtpy. Scheduled onstream: 1981.

• Helwan Portland Cement Corp. (Assiut). A 1.5 million mtpy plant is being built by a European consortium headed by Polysius. Equipment will include: four-stage Dopol heat exchanger; Prepol AS precalciner; rotary kiln; two raw-mix grinding mills with a capacity of 210 mtph each; one cement-grinding mill, 120 mtph; two cement-grinding mills, each rated at 83 mtph; raw materials handling and dressing plant; mixing beds for limestone and clay; raw mix homogenizing

plant; clinker handling system; Polab II laboratory automation. Electrical equipment supplier: Brown Boveri. Bulk loading and bagging plant: Haver & Boecker. Consultants: Arab Swiss Engineering Co. Scheduled onstream: 1982.

Ethiopia

Cement production			Capacity	
1976	1977	1978	1979	1980
.126	.113	.099	.119	.145

Gabon

Cement production			Capacity	
1976	1977	1978	1979	1980
—	.180	.140	.420	.420

• N'toum (25 miles from Libreville). Societe des Ciments du Gabon. Capacity: 350,000 mtpy. Wet process using 460-ft.-long rotary kiln. Contract awarded to Creusot-Loire Entreprises and Lafarge Conseils & Etudes (France). Onstream: 1979.

Ghana (see also West Africa)

Cement production			Capacity	
1976	1977	1978	1979	1980
.679	.565	.489	.800	1.400

• Tema. Ghana Cement Works Ltd. Expansion to double plant capacity to 800,000 tpy. Due onstream in 1979.

Guinea, Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
—	—	—	—	.250

• Conakry. Contract awarded to Lafarge Conseils et Etudes for supervision of construction of clinker grinding plant in Conakry. Capacity: 250,000 mtpy. Start-up scheduled for 1981. The project is sponsored by the government of the Republic of Guinea, represented by the Estate Committee for Cooperation with the countries of the Arab League (Ministry of Planning and Cooperation).

• Three cement plant projects with a capacity of about 200,000 tpy are under consideration. Possible locations: Kindia (100 km east of Conakry); Lebekere (near the town of Mali on the Senegal border); Siguiri (on the Niger River near the Mali border).

Ivory Coast

Cement production			Capacity	
1976	1977	1978	1979	1980
.800	.961	.962	1.350	1.350

• Clinker grinding plants only.

Quantities in million metric tons

Kenya

Cement production			Capacity	
1976	1977	1978	1979	1980
.987	1.137	1.140	1.4	1.6

• East African Portland Cement Co.—Athi River Works. Uprating of the cement works from 265,000 mtpy to 450,000 mtpy of pozzolanic cement. Additional slurry milling and cement milling capacity being installed. Consultants: Blue Circle technical group. Onstream: 1980.

Liberia

Cement production			Capacity	
1976	1977	1978	1979	1980
—	.089	.133	.220	.220

• Liberia Cement Corp.: Monrovia. Clinker grinding plant.

Libya (Libyan Arab Republic)

Cement production			Capacity	
1976	1977	1978	1979	1980
.7	1.5	1.8	2.7	3.9

• Near El Homs: National Cement & Building Materials Co. New 3,000 tpd dry process plant onstream in 1979. Major equipment supplied by Fives-Cail Babcock (France) includes: four-stage cyclone preheater; 5.4m × 88m rotary kiln; grate cooler; 1,300 tph crusher for limestone and clay; 80 tph crusher for gypsum and iron ore; 270 tph raw grinding unit; clinker grinding station with two 100 tph closed-circuit ball mills.

Madagascar, Democratic Republic of (Malagasy Republic)

Cement production			Capacity	
1976	1977	1978	1979	1980
.07	.05	.07	.07	.07

• E.S. Cement d'Antsirabe (Ibity, Province of Antsirabe). Contract awarded to Loesche GmbH for construction of new vertical kiln cement plant rated at 115,000 mtpy. Scheduled onstream in 1981.

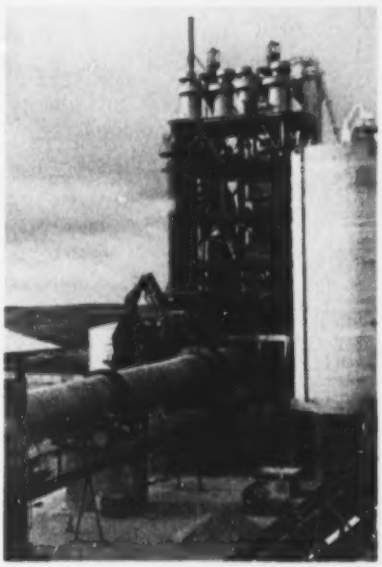
Malawi

Cement production			Capacity	
1976	1977	1978	1979	1980
.085	.094	.103	.144	.144

Mali

Cement production			Capacity	
1976	1977	1978	1979	1980
.086	.035	.034	.05	.05

• The government of the Republic of Mali is building a second cement plant with a capacity of 260,000 tpy at Diamou (400 km west of the capital, Bamako). Clinker grinding station will be built at Bamako. Clinker will be transported by rail from Diamou to Bamako. Plant is scheduled to go onstream in mid-1984. Prospective Engineering Gestion (Switzerland) is handling engineering and project management.



Libya: National Cement & Building Materials Co.'s new 3,000 tpd dry process plant went onstream in 1979. *(Courtesy: Fives Cail-Babcock)*

Morocco

Cement production			Capacity	
1976	1977	1978	1979	1980
2.216	2.604	2.802	4.118	4.692

• Rabat—Asment de Temara S.A. Capacity: 500,000 mtpy. Onstream: 1979. Consulting engineer: Technip and Lafarge Conseils et Etudes. Special adviser to the client and start-up supervisor: The SNC Group. Major equipment, supplied by the Fuller Co., includes 15 ft. × 220 ft. rotary kiln; four-stage suspension preheater; 3.962 × 13.4m raw mill; 3.962 × 12.929m finish mill; inclined grate clinker cooler; dust collectors; pneumatic conveying system.

• Oujda—Cement Magrebine. New 1 million mtpy dry process plant at Oujda incorporates two Polysius Dopol preheater kilns rated at 1,980 tpd each. The Blue Circle Group provided consultant services. Onstream in 1979.

• Casablanca: Societe Nationale des Materiaux de Construction awarded contract for new 1 million mtpy dry process

Tunisia: Djebel Oum El Khelil 3,000 tpd plant, placed in operation in 1979, incorporates a Fives-Cail Babcock 5.4×96 m. rotary kiln equipped with a 4-stage cyclone preheater. *(Courtesy: Fives Cail-Babcock)*

plant to be built near Casablanca. The Blue Circle Group will provide consultant service. Operation was scheduled for 1980.

• Casablanca II: Lafarge Maroc S.A. Lafarge Conseils et Etudes are consulting engineers for 21.2 million-mtpy, dry-process plant scheduled for 1983 operation near Bouskoura. Fives-Cail Babcock is the turnkey contractor.

Mozambique

Cement production			Capacity	
1976	1977	1978	1979	1980
.217	.325	.354	.790	.990

Niger

Cement production			Capacity	
1976	1977	1978	1979	1980
.035	.036	.043	.040	—

• Malbaza—Societe Nigerienne de Cement. Lafarge Conseils et Etudes is consultant for 300,000 mtpy plant expansion incorporating a dry process preheater system. Start-up is scheduled for 1983.

Nigeria

Cement production			Capacity	
1976	1977	1978	1979	1980
1.274	1.400	1.500	2.230	4.152

• Ashaka Cement Co.—Two-kiln plant, rated at 800,000 mtpy, near Ashaka on the Gongola River. Onstream: 1979. Blue Circle Group participated as management partners on project. Each Polysius Gepol preheater kiln is rated at 1,150 mtpd.

• Benue Cement Co. Ltd.—Yandev plant. New plant incorporating two production lines rated at 1,450 mtpd clinker each. Start-up was scheduled for 1979. Major equipment, supplied by Humboldt Wedag, includes: two 4.4×64m rotary kilns equipped with four-stage Humboldt preheaters; two 4.4×8m tube mills for raw meal grinding.

• Blue Circle: Lichtenburg. Polysius furnishing one Dopol kiln plant with Prepol precalciner. Kiln dimensions are 14 ft.×207 ft; rated at 1,430 tpd. Scheduled onstream in 1983.

Reunion

Cement production			Capacity	
1976	1977	1978	1979	1980
.158	.158	.132	.210	.210

Senegal

Cement production			Capacity	
1976	1977	1978	1979	1980
.386	.330	.357	.400	.400

South Africa, Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
7.046	6.573	6.824	8.914	9.491

• Cape Portland Cement Co.: De Hoek.—onstream in 1980. Addition of one Polysius Dopol preheater kiln, rated at 1,600 tpd.

Sudan

Cement production			Capacity	
1976	1977	1978	1979	1980
.164	.150	.142	.370	.370

• Maspio Cement Corp.: Expanding Atbara plant. Major equipment, supplied by F. L. Smidth, includes: one 750 tpd rotary kiln, 15 ft.×12½ ft.×329 ft., with single-stage cyclone preheater and Unax planetary cooler; 10½ ft.×30 ft. raw mill; 11 ft.×36 ft. finish mill. Scheduled onstream: 1982.

Tanzania

Cement production			Capacity	
1976	1977	1978	1979	1980
.244	.247	.260	.300	.600

• Tanzania Saruji Corp.: Building a new plant at Tanga (in northeastern Tanzania). F. L. Smidth supplying major equipment, including: one 1,600 tpd kiln, 15 ft.×224 ft., with four-stage cyclone preheater and Unax planetary cooler; 15 ft.×25 ft. raw mill; 14½ ft.×43 ft. finish mill. Scheduled onstream in 1980.

• Tanzania Saruji Corp.: Awarded contract to F. L. Smidth to supply equipment for new 800 tpd plant at Mbeya in southwestern Tanzania. Major equipment includes: 4×6m, 1250 kW raw mill; 3.95×58m, 800 mtpd rotary kiln equipped with a four-stage cyclone preheater and Unax planetary cooler; 3.4×12m, 1820 kW finish mill. Scheduled onstream in 1981.

Togo (see West Africa)

Cement production			Capacity	
1976	1977	1978	1979	1980
.157	.239	.328	.300	.300

• Ciments du Togo: Lome, Togo. Extending capacity of clinker grinding plant from 300,000 mtpy to 500,000 mtpy. Scheduled for completion in 1981. Consulting engineers: Prospective Engineering Gestion.

Tunisia

Cement production			Capacity	
1976	1977	1978	1979	1980
.485	.615	.882	1.434	2.750

• Societe des Industries Cimentieres du Centre (SICC) has signed a contract with Holderbank Management and Consulting Ltd. for the engineering and project management of a cement plant to be built ner Enfida (100 km east of Tunisia). The plant will be rated at 1 million tpy. Production is slated for 1982 start-up. Equipment will be supplied by Kawasaki Heavy Industries in cooperation with C. Itoh & Co. and Marubeni Corp. Pyroprocessing unit will include a Kawasaki suspension preheater.

• Djebel Oum El Khelil cement plant: 3,000 tpd clinker dry process plant was scheduled to start operation in 1979. Major equipment, supplied by Fives-Cail Babcock, includes: 5.4×96m rotary kiln equipped with four-stage twin cyclone preheater; 5×16.25m, 230 tph raw mill; 4.6×15.25m, 140 tph finish mill.

• Les Ciments de Bizerte: Bizerte. Expansion via one dry process 700,000 mtpy kiln. Contractor: F. L. Smidth. Consulting engineer: Lafarge Conseils et Etudes. Start-up was scheduled for 1979. Equipment, supplied by F. L. Smidth, includes: MPS mill; a 5.25×178m rotary kiln with two-stage cyclone preheater; two

44 × 13m Unidan mills; an electrofilter; and a Fluxo packer.

• Societe des Ciments Tunisiens: Planning 1 million mtpy dry process plant in the Tunis area, at Djebel Oust. Scheduled for 1983 operation. Consulting engineers: Lafarge Conseils et Etudes

• Societe Tunisienne de Ciment Blanc. White cement works, rated for 100,000 mtpy. Scheduled for 1984 operation. Consulting engineers: Lafarge Conseils et Etudes.

Uganda

Cement production			Capacity	
1976	1977	1978	1979	1980
.088	.09	—	—	—

• Uganda Cement Corp.: Hima (near Zaire border). Adding 600 tpd production line. Contract awarded to Humboldt Wedag. Dry process, using a preheater, 50 × 3.6m rotary kiln and a grate cooler.

West Africa (see Togo, Ghana, & Ivory Coast)

Cement production			Capacity	
1976	1977	1978	1979	1980
—	—	—	1.2	1.2

• Les Ciments de l'Afrique de l'Ouest has been formed by the West African governments of Togo, Ghana, and the Ivory Coast to build a 1.2 million tpy cement plant near Tabligo, Togo. The Blue Circle Group (Great Britain) has the contract for the engineering services. Polysius supplied the major equipment, including two Prepol precalciner kilns, each rated at 2,640 tpd. Onstream in 1979.

Zaire

Cement production			Capacity	
1976	1977	1978	1979	1980
.534	.488	.474	.860	.901

• Planning expansion of cement plant in Shaba.

Zambia

Cement production			Capacity	
1976	1977	1978	1979	1980
.460	.320	.278	.330	.370

• Planning extension of Zambian cement plant.

Zimbabwe

Cement production			Capacity	
1976	1977	1978	1979	1980
.541	.486	.404	.950	.950

Afghanistan

Cement production			Capacity	
1976	1977	1978	1979	1980
.157	.157	.160	.860	N.A.

• In Kandahar region: New 1,600 mtph plant was scheduled for 1979 operation. Contract awarded to consortium consisting of Fuller Co., Fischbach-Moore International, and Oman Construction. Pyroprocessing system includes two preheater-equipped rotary kilns.

Bahrain

Cement production			Capacity	
1976	1977	1978	1979	1980
.092	.190	.210	.200	.200

• Clinker grinding plant only.

Bangladesh

Cement production			Capacity	
1976	1977	1978	1979	1980
.227	.341	.350	.375	.395

Burma

Cement production			Capacity	
1976	1977	1978	1979	1980
.229	.250	.250	.540	.540

China, People's Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
49	56	58	N.A.	N.A.

National Technical Import Corp. of the People's Republic of China has awarded the following contracts for cement plants:

• For 2,000 tpd plant at Xuzhou. Ordered from Romania in 1978.

• For 4,000 tpd plant at Tangshan. Ordered from Ishikawajima Harima Heavy Industries Co. Ltd. (Japan) in 1979.

• For 4,000 tpd coal-fired plant at Anhui Province. Joint order in 1980 to Mitsubishi Heavy Industries, Ltd., Mitsubishi Mining & Cement Co., Ltd., and Meiwa Trading Co. Ltd. Scheduled for completion in 1984.

Hong Kong

Cement production			Capacity	
1976	1977	1978	1979	1980
.765	1.029	1.236	2.245	2.245

• China Cement Co.: Building new 1.5 million tpy plant in Castle Peak (New Territories). Scheduled onstream in 1983. Bendy Engineering provided preliminary engineering studies. Major equipment to be provided by Allis-Chalmers, including: 4,600 mtpd reinforced suspension preheater with major process auxiliaries and clinker grinding equipment; preheater tower (about 326 ft. height); 16 ft × 250 ft. rotary kiln; three Compeb rotary finish mills, each 5,625 hp, 15 ft. diameter × 45½ ft. length.

India

Cement production			Capacity	
1976	1977	1978	1979	1980
18.635	19.084	19.561	22.765	26.497

• Coromandel Fertilizers Ltd.: New 1 million mtpy dry process (precalcining system) plant will be built in the Cudappah district of Andhra Pradesh (south India).

Quantities in million metric tons

Consulting engineering contract awarded to Holtec Engineering (Holderbank Management & Consulting Ltd.).

• Modi Rubber Ltd.: Holtec Engineers have prepared a report for a new 1 million mtpy cement plant to be located in the Raipur district of Madhya Pradesh in central India.

• State Industrial Development Corp. of Kerala (south India): Holtec Engineers have been retained by the corporation for the engineering of a new 1,200 mtpd cement plant to be built at Walayar in the Palghat district.

• Narmada Cement Co.: Jafarabad. New plant scheduled for 1981 start-up. Fuller Co. supplying following equipment: 15 ft. × 220 ft. rotary kiln; SF-141 flash calciner (3,000 mtpd); 12½ ft. × 45 ft. finish ball mill; two raw roller mills; coal roller mill; grate clinker cooler.

• Larsen & Toubro, Cement Machinery Div.: Constructing 3,200 mtpd dry process plant at Chandrapur, Maharashtra. The equipment will be based on the F. L. Smidth precalciner/kiln system. Scheduled onstream in 1982.

• Hetauda Cement Industries Ltd.: New 260,000 mtpy dry process plant to be built at Hetauda (west of Kathmandu), Nepal. Consulting engineers: Prospective Engineering Gestion.

• Birla Jute Manufacturing Co. Ltd.: Have placed an order with Larsen & Toubro and F. L. Smidth for an extension to their Patna Plant. The new installation will comprise a 2,500 mtpd dry process production line with precalcining kiln, raw grinding department, raw meal homogenizing plant, kiln department, and coal grinding plant.

• Century Spring & Manufacturing Co. Ltd.: Larsen & Toubro supplied major equipment for a 2,400 mtpd dry process plant at Maihan Madhya Pradesh. Scheduled onstream: 1979.

• Cement Corp. of India Ltd.: Installed 600 tpd kiln with four-stage cyclone preheater and Unax cooler at Rajban, Himachal Pradesh (northern region). Supplier: Cement Machinery Div., Larsen & Toubro (Bombay) and F. L. Smidth. Engineering consultants: Holtec Engineering. Onstream in 1979.

• Cement Corp. of India Ltd.: Installed three 1,200 tpd dry-process units at Neemuch, Akaltara and Yerrguntla Himachal Pradesh (western region). Supplier: Cement Machinery Div., Larsen & Toubro (Bombay). Engineering consultants: Holtec Engineering. Scheduled onstream: 1979.

• J. K. Synthetics Ltd.: Expansion at Nimbahera, Rajasthan. Equipment suppliers: Larsen & Toubro (Bombay) with F. L. Smidth. Major equipment includes 1,200 tpd, 14½ ft. × 210 ft. rotary kiln with four-stage cyclone preheater and Unax planetary cooler; 14 ft. × 23 ft. raw mill; and 12½ ft. × 36 ft. finish mill. Scheduled onstream: 1979.

• Andhra Cement Co., Ltd.: New dry process 1,200 tpd plant at Nadikudi in the Guntur district of Andhra Pradesh. Consultants: Techno Craft Engineering.

• Tadpatri Cements Ltd.: New 400,000 tpy plant at Tadpatri. Consultants: Techno Craft Engineering Ltd.

• Raasi Cement Co. Ltd.: New 200,000 tpy cement plant at Wazeerabad in the Nalgonda district of Andhra Pradesh. Consultants: Techno Craft Engineering.

• State Industrial Development of Orissa, India: Have retained Holtec Engineers for engineering a proposed 130,000 tpy expansion of its Hira cement plant which has a current capacity of 396,000 tpy. Scheduled for competion in 1982.

• Deccan Cements Ltd.: Nalgonda district of Andhra Pradesh. Holtec Engineers will build a small scale, 200 tpd capacity plant, scheduled to go onstream in 1982.

• Shri Bhogeshwara Cement and Mineral Industries Ltd.: Kurnool district of Andhra Pradesh. Holtec Engineers will build a small scale, 200 tpd capacity plant, scheduled to go onstream in 1982.

• Karnataka Cement Ltd.: Holtec Engineers have prepared a feasibility study for setting up a 200 tpd plant (rotary kiln with suspension preheater) in Gulbarga district of Karnataka.

• The Associated Cement Cos. Ltd.: Wadi Cement Works to be expanded by 1 million mtpy with installation of a new precalciner kiln, due onstream by end of 1981. Precalciner is a Mitsubishi fluidized unit.

• The Associated Cement Cos. Ltd.: Gagal (in Himachal Pradesh). New plant being set up with capacity of .56 mtpy. Will use Mitsubishi fluidized calciner system and coal as fuel. Major equipment for both plants will be supplied by ACC-Vickers-Babcock Ltd. Gagal plant scheduled for operation in 1982.

Indonesia

Cement production			Capacity	
1976	1977	1978	1979	1980
1.806	2.678	3.628	5.320	6.670

• P. T. Semen Baturaja: 500,000 mtpy plant at Baturaja, South Sumatra, is scheduled for completion in 1981, incorporating IHI SP-type precalcining system. Engineering consultants: Dyckerhoff GmbH.

• P. T. Perkasa Indonesia Cement Enterprise (Indocement Group): Cibinong, West Java. Adding a 3,200 tpd dry process production line. Major equipment suppliers are KHD Humboldt Wedag and Centunion (Spain). Production will be based on the Pyroclon process, using a 70 × 4.6m rotary kiln and a Humboldt twin-type preheater with secondary firing. Scheduled operation: 1980. A fourth production line with a 3,200 tpd output has been commissioned.

• P. T. Semen Tonasa: New 500,000 tpy plant projected for Biringere, Sulawesi. Scheduled operation: 1979. Engineering consultants: Dames & Moore and Dyckerhoff Engineering GmbH. Major processing equipment, supplied by F. L. Smidth, includes: 4.75 × 75m rotary kiln with four-stage suspension preheater; 4,150-hp Unidan finish grinding mill; FLS cement cooler.

• P. T. Semen Padang: New 2,000 tpd plant build at Indarung, Western Sumatra. Major equipment, furnished by F. L. Smidth, includes: one 2,000 tpd, 16½ ft. × 263 ft. rotary kiln with four-stage cyclone preheater and Unax

planetary cooler; 16 ft.×28 ft. raw mill; 14½ ft.×39 ft. finish mill. Bendy Engineering Co. and H. K. Ferguson International Co. were consulting engineers. H. K. Ferguson is technical consultant for construction and start-up. Onstream in 1980. Extensions planned to expand capacity with another 600,000 tpy by 1981.

• P. T. Semen Andalas Indonesia has awarded the Mitsubishi Corp.-Kobe Steel consortium a contract to construct a 1 million ton per year cement plant in the northern part of Sumatra. Plant is scheduled to go onstream in early 1983. Will incorporate the NSP suspension preheater system developed jointly by Kobe Steel and Nihon Cement Co. Kobe Steel will supply engineering, equipment, and field construction. Blue Circle Industries will provide management and operation of the new plant.

• P. T. Perkasa Agung Utama Indonesia Cement Enterprise: KHD Humboldt Wedag and Centunion (Madrid) have received award to build a 4,600 tpd plant. Major equipment includes 5×78m rotary kiln; twin type Pyroclon preheater; Humboldt Wedag triple grate cooler. Scheduled for mid-1982 operation.

Iran

Cement production			Capacity	
1976	1977	1978	1979	1980
5.4	7.	9.	16.343	N.A.

• Because of the political situation in Iran, the status of cement plant construction activity is not known. The latest available data appeared in the January 1979 issue of PIT & QUARRY.

Iraq

Cement production			Capacity	
1976	1977	1978	1979	1980
—	4.6	6.5	7.075	7.075

• State Organization of Industrial Design & Construction: Awarded an order to construct a 1 million mtpy cement plant to Kawasaki Heavy Industries Ltd. and Marubeni Corp. The plant will be erected in Hit City (180 km west of Baghdad), using the Kawasaki suspension preheater system. Lafarge Conseils et Etudes is in charge of supervision of construction.

• Ministry of Industry and Minerals: New 3,200 tpd cement production line at Badoosh cement factory with Fives-Cail Babcock acting as general contractors. Start-up scheduled for end of 1982. Badoosh is located 26 km northwest of Mossoul.

Quantities in million metric tons

Israel

Cement production			Capacity	
1976	1977	1978	1979	1980
1.999	1.852	1.996	2.3	2.3

Japan (includes Ryukyu Islands)

Cement production			Capacity	
1976	1977	1978	1979	1980
68.198	75.176	84.353	108.973	N.A.

• Mitsui Cement Co.: Tagawa Works expansion via IHI SF precalcining system. Start-up of 5×75m kiln in 1979.

• Osaka Cement Co. Ltd.: Ibuki Works. Expansion via IHI SF precalcining system. A 2,700-mtpd, 3.8×79m kiln onstream in 1979.

• Sumitomo Cement Co. Ltd.: Hachinohe Works expansion via IHI SF precalcining system. A 4.7×75m kiln went onstream in 1979.

• Ube Kosan Co.: Kanda Works expansion via IHI SF precalcining system. Start-up of a 5.4×5.5×100m kiln in 1979.

• Chichibu Cement Co.: Chichibu Works expansion via IHI NSF five-stage precalcining system. A kiln started up in 1979.

• Hitachi Cement Co. Ltd.: Hitachi Works expansion via IHI five-stage precalcining system. A kiln started up in 1979.

• Mitsui Mining Co. Ltd.: Tagawa Works expansion via IHI NSF coal-firing, precalcining system adding one preheater state. A kiln started up in 1980.

• Nittetsu Cement Co. Ltd.: Muroran Works expansion via IHI NSF precalcining system, adding one preheater stage. A kiln started up in 1980.

• Chichibe Cement Co., Ltd.: Kumagaya Works via IHI NSF coal-firing precalcining system adding one preheater stage. A kiln started up in 1980.

Jordan

Cement production			Capacity	
1976	1977	1978	1979	1980
.533	.501	.553	.6	1.2

• Kaiser Engineers, Inc. (subsidiary of Raymond International, Inc.) will provide consulting engineering and construction management services for a 1 million mtpy cement plant to be built at Rashadiya, midway between Amman and Aqaba. Two 1,600 mtpd preheater kilns will be installed. Scheduled completion: 1982.

Nigeria: Ashaka Cement Co. two-kiln plant near Ashaka on the Gongola River went onstream in 1979. Each Polysius preheater kiln is rated at 1,150 tpd. *(Courtesy: Blue Circle Industries Limited)*

• Jordan Cement Factories Co. Ltd.: Fuheis. Fifth kiln, onstream in 1979, boosted production to 1.1 million mtpy. The kiln is a Polysius Dopol preheater unit. A sixth kiln is scheduled for operation in 1982. The new unit will use the DD process suspension preheater developed jointly by Kobe Steel and Nihon Cement Co. Kobe Steel will provide engineering, equipment supply, and field erection work. The contract was awarded to the Mitsubishi Corp./Kobe Steel consortium.

• The board of directors of the joint Jordanian-Syrian Industrial Co. has decided to establish a plant for the production of white cement in Jordan. Scheduled operation: 1983.

Korea (North) Democratic Peoples Republic

Cement production			Capacity	
1976	1977	1978	1979	1980
7.5	8.2	8.5	N.A.	N.A.

Korea (South), Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
11.873	14.418	15.467	20.3	23.3

• Union Corp., Seoul, has entered into a contract with F. L. Smidth covering the supply of machinery and electrical equipment for a new 300 tpd white cement plant to be erected at a site 200 km southwest of Seoul.

The order comprises a 3.45×60m rotary kiln with a two-stage cyclone preheater; Unax cooler and heat exchanger; a Tirax raw mill, and a Unidan cement mill, both with a Symetro gear.

• Ssang Yong Cement Industrial Co. Ltd.: Expanded Donghae plant—onstream 1980. Polysius supplied major equipment for two complete cement plant lines, including: two double rotator 15.7×55.7 ft. ball mills for raw grinding, each rated at 330 tph, with 3,100-hp motors; two five-stage Dopol preheaters with Prepol precalciners; two 4,620-tpd, 17 ft.×230×335 ft. rotary kilns with planetary coolers; two two-compartment ball mills for closed circuit cement grinding—each 16 ft.×54 ft., mill rated at 165 tph and equipped with a 7,200-hp. motor; four 21 ft. diameter turbo separators.

• Sung Shinn Chemical Co. Ltd: Expanded Tanyang plant—onstream 1979. Polysius supplied major equipment, including one Prepol preheater with precalciner/kiln rated at 3,300 tpd.

• Tong Yang Cement (Seoul) has started an expansion program for its Sam Chok plant. Fuller Co. is supplying equipment, including 48×60 in. jaw crusher; 42. in. gyratory crusher; two 10 ft.×70 ft. rotary dryers; two 13 ft.×45 ft. raw mills; two 16 ft.×245 ft. rotary kilns with four-stage twin preheaters; clinker coolers; three 13 ft×45 ft. finish mills; plus blending, conveying, and dust collecting equipment.

Kuwait

Cement Production			Capacity	
1976	1977	1978	1979	1980
.352	.329	.621	1.425	1.425

• Kuwait Cement Co.: Shuaiba. New 75,000 mtpy white cement plant was scheduled onstream in 1979. Major equipment furnished by KHD Humboldt Wedag.

Lebanon

Cement Production			Capacity	
1976	1977	1978	1979	1980
.506	1.600	1.310	2.452	N.A.

• Societe Libanaise des Ciments Blancs, Chekka Works: Dry process extension for white cement of 100,000 mtpy. Complete design and engineering: Lafarge Conseils et Etudes (France). Start-up was scheduled for 1979.

Malaysia

Cement Production			Capacity	
1976	1977	1978	1979	1980
1.586	1.740	2.200	2.679	2.994

• Associated Pan Malaysia Cement Sdn Bhd: New 1.2 million mtpy plant built on site of existing Rawang cement plant. Machinery will be supplied and erected by Ishikawajima Heavy Industries. Malayan Cement Berhad, a Blue Circle Industries subsidiary, has a 50% equity in the project. Scheduled onstream: 1980.

• Bukit Sagu. Lafarge Conseils et Etudes have prepared a feasibility study for a new 500,000 mtpy cement plant.

Mongolia

Cement Production			Capacity	
1976	1977	1978	1979	1980
.144	.150	.170	.170	N.A.

Nepal

Cement Production			Capacity	
1976	1977	1978	1979	1980
.036	.040	.050	.044	.048

• Onoda Engineering and Construction Co. has been awarded a contract for construction of a 250,000 mtpy cement plant in Nepal, with completion scheduled for 1981.

• Hetauda Cement Industries Ltd.: Hetauda (125 km south of Kathmandu). New 260,000 tpy plant equipped with a preheater kiln is scheduled for mid-1983 operation. Prospective Engineering Gestion (Switzerland) is technical consulting firm.

Oman, Sultanate of

Cement Production			Capacity	
1976	1977	1978	1979	1980
.300	.392	—	—	—

• Oman Cement Co. is setting up a 1 million mtpy plant in the Muscat region. Production is scheduled to start in 1982.

Pakistan

Cement Production			Capacity	
1976	1977	1978	1979	1980
2.980	3.156	3.228	3.478	3.488

• Mustehkam Cement Ltd.: Added a 300,000 tpy dry process, one kiln unit. KHD Humboldt/Wedag Industrieanlagen supplied the major equipment. Scheduled onstream in 1980.

• Javedan Cement Ltd. (State Cement Corp. of Pakistan), Javedan. Adding a 300,000 tpy dry process, one kiln unit. Fuller Co. supplying major equipment, including: 13½ ft.×190 ft. rotary kiln with four-stage preheater; 12 ft.×26 ft, raw mill; 12 ft.×37 ft. finish mill; clinker cooler;

• Pak-Iran Cement: New 300,000 tpy plant, scheduled for 1980 operation, in Darwaza (Baluchistan).

• In Kohat (NWFP): New 300,000 tpy plant, scheduled for 1980 operation, in Darwaza (Baluchistan).

• Early in 1979, the government of Pakistan engaged the joint venture of Bendy Engineering Co., USA, and Industrial & Cement Engineering, Ltd., Pakistan, to prepare a feasibility study for the establishment of a new cement plant near Nizampur in Pakistan.

Philippines

Cement Production			Capacity	
1976	1977	1978	1979	1980
4.229	4.112	4.147	6.9	N.A.

Qatar

Cement Production			Capacity	
1976	1977	1978	1979	1980
.179	.176	.211	.240	.270

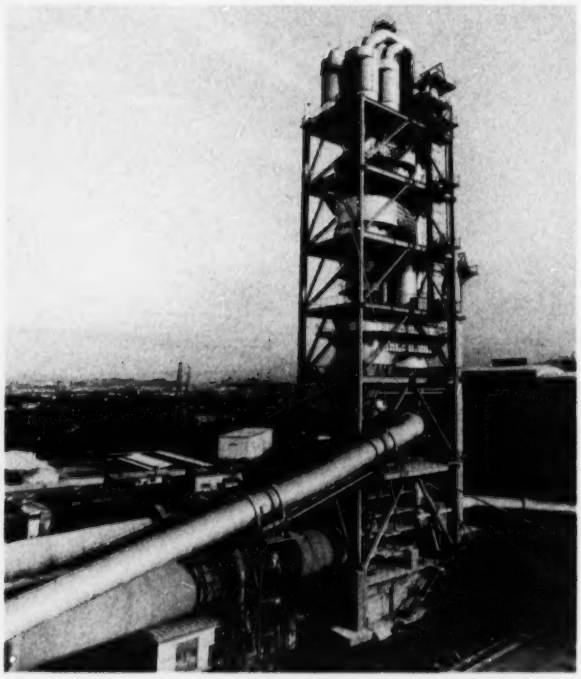
Saudi Arabia

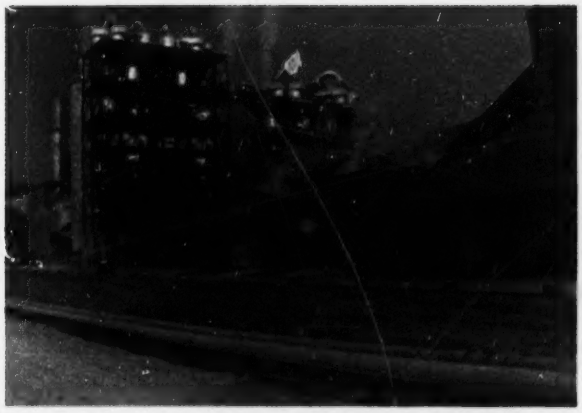
Cement Production			Capacity	
1976	1977	1978	1979	1980
1.300	1.292	1.510	2.800	4.960

• Buraidah Cement Co. (Qassim) will build a 2,000 tpd plant near Buraidah (400 km northwest of Riyadh). Equipment will be furnished by KHD Humboldt Wedag. Operation was scheduled for 1980. Binladen-Kaiser, a Saudi Arabian affiliate of Kaiser Engineers, Inc., was consulting engineer for the project.

• Saudi-Bahraini Cement Co. has awarded a contract to Ishikawajima-Harima Heavy Industries Co., Ltd. (IHI), Japan, for construction of a 6,000 mtpd plant at Abgeig (about 100 km west of Damman). Operation is scheduled for 1981. Four 1,500 mtpd kilns will be installed. Holderbank Management & Consulting Ltd. is acting as consultant for this project.

• Saudi Kuwaiti Cement Manufacturing Co. building new 7,000 tpd plant on the Arabian Gulf coast near Al Jubail in the east-





South Korea: Ssang Yong Cement Industrial Co., Ltd.'s expanded Donghae plant was placed onstream in 1980. Polysius supplied two complete cement plant lines, each rated at 4600 stph. *(Courtesy: Polysius Corp.)*

Japan: Mitsui Mining Co.'s Tagawa Works extension added IHI NSF precalcining system in 1980. *(Courtesy: IHI Inc.)*

ern province. Prospective Engineering Gestion (Switzerland) is consulting engineer for the project. Plant is scheduled to be operational in 1983.

• Southern Province Cement Co.: New 5,000 mtpd plant to be erected at plant site 35 km east of the Red Sea, 60 km southeast of the city of Gizan, and 11 km from the Yemen border. The joint-venture turnkey contract was awarded to the Fuller Co. and Hyundai International, Inc. (Korea). Consulting firm was Basse Sambre-E.R.I., S.A. The plant has been designed with two cement manufacturing systems side by side, each with a capacity of 2,500 mtpd. Major equipment incorporated in the process includes two 42 in. gyratory crushers, two 6,000-hp, 15 ft. × 42 ft.-long raw ball mills, a blending and kiln feed system, two 14½ ft. × 210 ft.-long kilns, two preheaters with flash calciners, two clinker coolers, as well as two 7,000-hp, 15 ft. × 48 ft.-long finish ball mills. Scheduled start-up: 1981.

• Yanbu Cement Co. Ltd.—New plant to be built near Ra's Baridi (at the Red Sea). Contract for construction was issued to KHD Industrieanlagen Humboldt Wedag AG (W. Germany). Plant will have two production lines with daily output of 3,000 tons of clinker, and was scheduled to go onstream in 1980.

• Yanbu Cement Co. and Arabian Cement Co., both of Jidda, have awarded a consulting job for planning, construction, and equipment installation for two new cement plants to Naigai Consulting Co., subsidiary of Onoda Cement Co., Japan. The mills will be built near Jidda and have a production capacity of 1 million tpy. KHD Industrieanlagen Humboldt Wedag is the major equipment supplier.

• Jizan Cement Co.: Two 2,500 mtpd precalciner kilns under construction in southern province. Major equipment supplier is Fuller Hyundai, as a joint venture. Scheduled onstream in 1981.

Singapore

Cement Production			Capacity	
1976	1977	1978	1979	1980
1.500	1.415	1.575	2.750	2.750

Sri Lanka

Cement Production			Capacity	
1976	1977	1978	1979	1980
.422	.480	.575	.715	.915

Syria (Syrian Arab Republic)

Cement Production			Capacity	
1976	1977	1978	1979	1980
1.110	1.395	1.467	2.031	2.313

Quantities in million metric tons

• Adra Cement Co.: New plant at Adra with two production lines, each with 1,000 tpd dry process kiln. Scheduled onstream in 1979. Plant and equipment supplied by Zab/Sket of the German Democratic Republic.

• Tartous Cement Co.: Two 600 tpd dry process kilns to come onstream at Tartous in 1980.

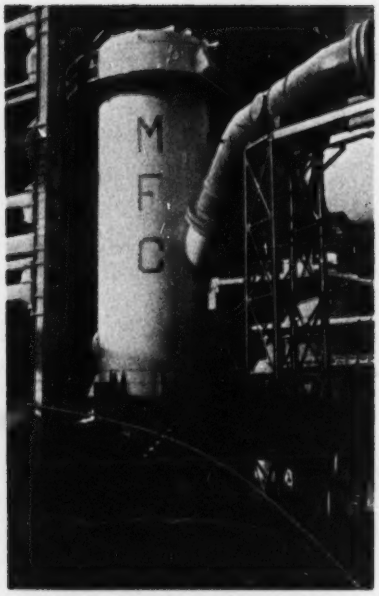
Taiwan

Cement Production			Capacity	
1976	1977	1978	1979	1980
8.757	10.334	11.461	11.158	13.368

• Asia Cement Corp.: Hualien. Adding a 3,000 tpd production line, using KHD Humboldt Wedag Pyroclon process (short rotary kiln and twin-type preheater with secondary firing system). Scheduled onstream in 1980.

• Chia Hsin Cement Corp.: Kangshan plant. Expansion was expected to start up in 1980. Fuller Co. supplying following equipment: one 15 ft. × 220 ft. rotary kiln; one preheater; one flash calciner; one Fuller-Loesche roller mill; one clinker grate cooler; blending system.

• Hsin-Hsin Cement Co. (Taipei). Major equipment furnished by Polysius for a 2,200-mtpd plant included: 3,200-hp center discharge raw mill, 4.4m-diameter × 15m-long, with two



India: The Associated Cement Co.'s, Ltd. are expanding their Wadi Cement Works with installation of a Mitsubishi Fluidized Calciner (MFC) system to add one million mtpy. *(Courtesy: The Associated Cement Companies, Limited)*

6m-diameter air separators; cyclone preheater with precalcining system; 4m-diameter × 65m-long rotary kiln; traveling grate cooler; 5,200-hp cement mill, 4.4m-diameter × 16m-long, rated at 120 mtph, with two 6m-diameter air separators; homogenizing system; central control system; pneumatic equipment; bagging plant. On-stream in 1979.

• Taiwan Cement Co. has signed a contract with F. L. Smidth for an extension of the Suao plant. The order covers a 3,200-tpd rotary kiln with a four-stage preheater and a precalciner, a Folax cooler, and a coal mill. Scheduled onstream: 1980.

• China Rebar Co. Ltd.: Tung Shan. Allis-Chalmers providing equipment and engineering services for conversion of MIAG-type suspension preheater to precalcining. Capacity will be increased from 2,400 to 3,000 mtpd. Start-up was scheduled for 1980.

Thailand

Cement Production			Capacity	
1976	1977	1978	1979	1980
4.458	5.088	5.180	N.A.	N.A.

• Siam Cement Co. Ltd.: Adding 4,000 tpd production line at Ta Luang (about 140 km from Bangkok). Equipment contract awarded to F. L. Smidth. The kiln will be of the dry process type with four stage preheater and separate precalciner. Other equipment includes: 3,050 kW raw mill, homogenizing plant, Folax cooler, and electrostatic precipitator. Scheduled onstream: 1981. An additional 4,000 tpd extension has been ordered. F. L. Smidth will supply major equipment, including: kiln with four-stage preheater and separate precalcining string; FLS bridge scraper storage for limestone and clay; Duodan raw mill; raw mill silo.

• The Siam Cement Co. Ltd. is expanding another plant at Tabkwang, Saraburi (approx. 130 km from Bangkok), by a new 4,000 tpd production line. Main machinery, to be supplied by F. L. Smidth, includes a 4.75 × 75m rotary kiln with four stage cyclone preheater and separate precalciner, a Folax cooler, two raw mills, and two cement mills with Symetro gear.

• Thai Lanna Cement Co.: Planning 2,300 tpd plant to go into operation by 1981 in the Lampang area.

United Arab Emirates (Abu Dhabi, Dubai, Sharja, Ajman, Fujaira, Umm al Quaiwan, Ras al Khaima)

Cement production			Capacity	
1976	1977	1978	1979	1980
.305	.310	.370	1.871	1.871

• Gulf Cement Co.: Ras al Khaimah. New 1 million mtpy cement plant to be built by UBE Industries of Japan. The W. S. Atkins Group will act as consultants for design and on-site supervision of construction. The project will utilize the UBE flash calciner system. Scheduled onstream in 1981.

• Union Cement Co., Ltd.: Ras al Khaimah. Third kiln of 1,500 tpd capacity is due onstream in 1980. Plant will incorporate Ishikawajima-Harima Heavy Industries Co., Inc. SF-type burning system (flash furnace/four-stage cyclone preheater/3.6m × 52m rotary kiln).

• Al-Ain Cement Factory: Al-Ain, Abu Dhabi. New 1,800 mtpd plant will use the IHI (Ishikawajima-Harima Heavy Industries Co., Ltd.) SF-type cement sintering system. Holderbank Management & Consulting Ltd. will act as consultant for planning and implementation of the project. Operation is scheduled for 1981.

• Emirate of Fujairah has awarded a construction contract to Voest-Alpine for a 1,600 tpd dry process plant. Kaiser Engineers, Inc. are the consultants on the project. Scheduled onstream in 1983.

Vietnam

Cement production			Capacity	
1976	1977	1978	1979	1980
—	.250	.350	1.	2.

• Technoimport has contracted with F. L. Smidth to supply equipment for a new 3,100 tpd plant at Hoang Thach near Dong Trieu. Equipment includes a 775 tpd crusher, blending and storage equipment for 43,000 tons of raw materials, an 18½ ft. × 23 ft., 3900-kW finish mill, an 18 ft. × 293 ft. kiln with four-stage twin preheaters and planetary cooler; a 6,500-kW finish mill, 17 ft. × 46 ft.; and equipment for dispatch of cement in bulk and sacks. The system further includes equipment for advanced, computerized control systems.

• Cimenterie de Ha Tien, Kien-Luong plant: Technoimport has awarded a contract to French subsidiary of Polysius AG for addition of a Dopol kiln, complete with a precalcining system and auxiliary equipment. The kiln has a capacity of 1 million tpy and was scheduled for 1980 operation. Major equipment includes: one precalcining system rated for 3,000 mtpd with 4.8 × 60 × 89.5m kiln with planetary coolers; one 4,500-hp air-swept raw mill, 5.2 × 11m, rated for 240 mtph; two 4,200-hp cement mills, each 4.2 × 14m, rated for 90 mtph.

Yemen (Yemen Arab Republic)

Cement production			Capacity	
1976	1977	1978	1979	1980
—	—	—	.068	.080

• Cement plant is to be constructed at Bajil, near Hodeida, with a capacity of 200,000 tpy.

• A 1,500 tpd dry process plant scheduled for 1982 operation near Amran. IHI (Japan) will supply engineering and equipment procurement and handle construction.

Australia

Cement production			Capacity	
1976	1977	1978	1979	1980
5.062	5.023	5.013	N.A.	N.A.

• Goliath Portland Cement Co., Ltd.: Railton, Tasmania plant expansion using Humboldt Wedag Pyroclon precalcination preheater system. Will double plant's production to 1 million mtpy. Scheduled for 1981 operation.

• Blue Circle Southern Cement Ltd.: Berrima plant expanded. F. L. Smidth, via licensee Vickers Ruwolt of Melbourne, was the supplier of major equipment, including: a 16½ ft. × 280 ft. rotary kiln, rated at 2,300 tpd, with four-stage cyclone preheater and Unax planetary cooler; and an 1,800 kW MPS raw mill. Start-up was scheduled for 1979.

Fiji Islands

Cement production			Capacity	
1976	1977	1978	1979	1980
.069	.075	.088	.125	.250

New Caledonia

Cement production			Capacity	
1976	1977	1978	1979	1980
.054	.041	.050	.180	.180

New Zealand

Cement production			Capacity	
1976	1977	1978	1979	1980
1.	.910	.800	1.400	1.400

EUROPE

Albania

Cement production			Capacity	
1976	1977	1978	1979	1980
.700	.700	.750	1.	N.A.

Austria

Cement production			Capacity	
1976	1977	1978	1979	1980
5.758	5.904	5.611	7.745	8.165

• Voralberger Zementwerke Loruns AG: Bludenz. Replacing a wet process kiln wih a KHD Humboldt Wedag preheater kiln plant. The new clinker production line will include: four-stage Humboldt preheater; 2.8 × 23m rotary kiln; 2.25 × 23m tube cooler. Kiln capacity rated at 260 tpd. Scheduled onstream: 1981.

• FR. Schmid: Waldegg. Added one Polysius Dopol 825 tpd preheater kiln. Onstream in 1980.

• Peggauer Cement plant Alois Kern: Peggau. Added one Polysius Lepol preheater/kiln, rated at 880 tpd. Onstream 1979.

Belgium

Cement production			Capacity	
1976	1977	1978	1979	1980
7.504	7.764	7.576	N.A.	N.A.

Bulgaria

Cement production			Capacity	
1976	1977	1978	1979	1980
4.361	4.666	5.149	N.A.	N.A.

Cyprus

Cement production			Capacity	
1976	1977	1978	1979	1980
1.026	1.074	1.107	1.140	1.200

Quantities in million metric tons

Czechoslovakia

Cement production			Capacity	
1976	1977	1978	1979	1980
9.552	9.750	11.1	N.A.	N.A.

• Czechoslovak Cement Industry: Prachovice. Adding a 1.2 million tpy plant. Scheduled to go into operation: 1979.

Denmark

Cement production			Capacity	
1976	1977	1978	1979	1980
2.270	2.151	2.537	2.425	2.500

Finland

Cement production			Capacity	
1976	1977	1978	1979	1980
1.825	1.736	1.718	2.910	2.910

France

Cement production			Capacity	
1976	1977	1978	1979	1980
30.567	30.403	31.175	36.600	36.900

• Ciments d'Origny: Origny Ste. Benoite. Added one Prepol at precalciner kiln, rated at 1,925 tpd. Onstream in 1980.

Germany—East (German Democratic Republic)

Cement production			Capacity	
1976	1977	1978	1979	1980
11.345	12.103	12.5	N.A.	N.A.

Germany—West (Federal Republic of Germany)

Cement production			Capacity	
1976	1977	1978	1979	1980
33.832	31.871	32.993	35.	35.

• Dyckerhoff Zementwerke AG: Modifying clinker production line at Fortuna plant at Geseke by installing a KHD Humboldt Wedag Pyroclon preheater system to increase production from 800 to 1,500 mtpd. Scheduled onstream in 1981.

• Dyckerhoff Zementwerke AG: Lengerich plant. Installing Polysius Prepol preheater with precalciner/kiln, rated at 1,500 mtpd.

Greece

Cement production			Capacity	
1976	1977	1978	1979	1980
8.592	10.467	11.333	12.775	13.125

• Halyps Cement Co. S.A.: Aspropyrgos. Adding one 1,500 tpd dry process kiln. Scheduled onstream: 1980.

• Titan Cement Co. S.A.: Kamari plant extension with a 3,000 tpd cement unit. F. L. Smidth supplied main machinery, including: 5 × 80m, 3,000 tpd rotary kiln equipped with a four-stage cyclone preheater and a Unax planetary cooler; 3,310 kW raw mill with air separator; and 4.6 × 14m, 4,500 kW finish mill with air separator. Onstream in 1979.

• Heracles General Cement Co. S.A.: Planning 1.5 million mtpy plant at Milaki in Euboea to replace Piraeus plant. Scheduled onstream in 1982.

• Heracles General Cement Co., S.A.: Volos cement plant. Converting production lines four and five to the KHD Humboldt Wedag Pyroclon process. Clinker production of line four, equipped with a single-line Humboldt preheater, increased from 1,700 to 2,100 mtpd; that of kiln line five, with a two-line preheater, increased from 2,300 to 3,000 mtpd.

Hungary

Cement production			Capacity	
1976	1977	1978	1979	1980
4.298	4.621	4.764	4.857	5.200

Greece: Titan Cement Co.'s new 3,000 tpd production line, onstream in 1979, incorporates an FLS rotary kiln equipped with a 4-stage cyclone preheater and a Unax planetary cooler. *(Courtesy: F.L. Smidth & Co., Inc.)*

Iceland

Cement production			Capacity	
1976	1977	1978	1979	1980
.144	.139	.133	.200	.200

Ireland

Cement production			Capacity	
1976	1977	1978	1979	1980
1.617	1.581	1.795	2.150	2.150

• Irish Cement Ltd: Limerick plant. Adding 2,100 tpd capacity. F. L. Smidth supplying main equipment, including: 4.75 × 75m rotary kiln with four-stage cyclone preheater with calciner in the riser pipe; Unax cooler; raw mill; two cement mills; one coal mill installation; and electrostatic precipitators.

Italy

Cement production			Capacity	
1976	1977	1978	1979	1980
36.624	38.439	38.493	49.953	N.A.

• Unicem S.A.: Arcangelo. Plant conversion begun in 1980. Adding 600 tpd Polysius Lepol kiln with preheater grate and Recupol cooler.

Luxembourg

Cement production			Capacity	
1976	1977	1978	1979	1980
.299	.619	.935	.420	.420

Netherlands

Cement production			Capacity	
1976	1977	1978	1979	1980
3.476	3.894	3.918	5.220	5.220

Norway

Cement production			Capacity	
1976	1977	1978	1979	1980
2.681	2.420	2.339	1.765	1.740

Poland

Cement production			Capacity	
1976	1977	1978	1979	1980
19.908	21.304	21.678	N.A.	N.A.

Portugal

Cement production			Capacity	
1976	1977	1978	1979	1980
3.749	4.413	5.163	5.5	5.5

• CIMPOR—Cimentos de Portugal E.P.: Expanding production line at the Souselas works (in the north of Coimbra). Major equipment to be supplied by Polysius. Doubles capacity of plant to 2 million mtpy. Scheduled for 1980 operation.

Romania

Cement production			Capacity	
1976	1977	1978	1979	1980
12.6	13.1	14.	N.A.	N.A.

Spain (includes Canary Islands)

Cement production			Capacity	
1976	1977	1978	1979	1980
25.961	29.422	32.064	39.854	44.014

• Hornos Ibericos S.A.: Contract awarded to KHD Humboldt Wedag to set up a cement plant in cooperation with Centunion Corp. (Madrid) near Carboneras, about 50 km east of Almeria. Capacity of unit will be 3,000 tpd in a dry process rotary kiln with a Pyroclon preheater. Scheduled onstream in 1980.

• Cementos Portland S.A.: Olazagutia. Converting to Fuller SF process via an 1,800 mtpd flash calciner plus cooler expansion. Start-up scheduled for 1981.

Sweden

Cement production			Capacity	
1976	1977	1978	1979	1980
2.819	2.578	2.370	2.575	3.725

• Cementa AB: Added 4,700 mtpd production equipment to its Slite plant (on Gotland Island). Polysius Corp. supplied major equipment, including: 2,400 hp double roller mill rated at 400 mtph; 4.6 × 5.2m-diameter × 80m-long rotary kiln with precalcining and cyclone preheater unit; two 6,000 hp, 4.8m × 15.5m cement mills, each rated at 120 mtph; homogenizing system. Start-up was scheduled for 1979.

Switzerland

Cement production			Capacity	
1976	1977	1978	1979	1980
3.546	3.649	3.698	6.300	6.300

Turkey

Cement production			Capacity	
1976	1977	1978	1979	1980
12.421	13.869	15.409	18.732	19.552

• Canakkale Cimento Sanayii A.A., Instanbul, awarded contract to Fuller Co. to supply the process equipment and engineering for a 2,500 mtpd cement plant. Contract included 16½ ft. × 255 ft. rotary kiln and four-stage preheater, Fuller-Loesche roller mill, two finish mills, clinker cooler, kiln feed system, and blending system. Onstream in 1979.

• The Aslan, Turkey plant of Aslan ve Eskihisar Muttahit Cimento ve su Kirechi Fabrikalari A.S. planned expansion of capacity from 480,000 to 1 million mtpy.

• Further expansion of cement production is planned in Turkey. The Cisan (Turkiye Cimento Sanayee T.A.S.), the Turkish national cement enterprise, has placed an order with KHD Humboldt Wedag for the erection of seven cement plants. All plants will be dry process systems using Humboldt preheaters. The plants will be built according to one concept, retaining the same plant dimensions. Their clinker production will average about 1,750 mtpd with slight variations due to the different altitude levels of the plants and different raw materials deposits. Engineering consultants: Dyckerhoff Engineering GmbH.

United Kingdom

Cement production			Capacity	
1976	1977	1978	1979	1980
16.357	16.054	16.564	19.621	19.434

• Steetley Ltd.: Thrislington, England. Added one Polysius Gepol preheater/kiln, rated at 680 tpd. Onstream 1979.

• Rugby Portland Cement Co. Ltd.: Rochester, England. Added a 5.6×44m Polysius Lepol grate coupled with a 5.5×4.75×86m F. L. Smidth rotary kiln with Unax planetary coolers to produce a rated output of 2,200 mtpd of clinker. Uses semi-wet process, pressure filters, and sieve kneaders. Onstream in 1980.

• Ribblesdale Cement Co. Ltd.: Lancashire, England. Plant extension. F. L. Smidth supplying main equipment, including: circular raw material storage; raw mill; 2,300 tpd single-string suspended preheater with precalciner; 4.15×58m kiln with bypass; Folax grate cooler; two conditioning towers; and three electrostatic precipitators. Scheduled onstream: 1982.

U.S.S.R.

Cement production			Capacity	
1976	1977	1978	1979	1980
123.960	127.000	129.3	140.	N.A.

Yugoslavia

Cement production			Capacity	
1976	1977	1978	1979	1980
7.617	8.155	8.642	12.049	14.065

• Dalmacija Cement: Expanded Paitizan plant with 3,200 mtpd addition. Polysius Corp. furnished major equipment, including: 3,750 hp, 4.6m-diameter ×15.5m—long, center-discharge raw mill, equipped with two 6.5m-diameter air separators; 4.6m×70m rotary kiln equipped with precalcining preheater; two 5,400 hp, 4.4m-diameter×16m-long cement mills, each rated at 100 mtph. Onstream in 1979.

• Fabrika Cementa Novi Popovac: Expanding Popovac plant with a 2,000 tpd addition. Major equipment being supplied by F. L. Smidth and Pragoinvest includes: 16½ ft.×263 ft. rotary kiln, rated at 2,000 tpd, equipped with four-stage cyclone preheater and Unax planetary cooler; 16 ft.×27 ft., 2,800-kW raw mill; 16 ft.×46 ft., 5,160-kW finish mill. Scheduled onstream: 1981.

• Extension of Kosjeric plant situated about 150 km southwest of Belgrade. In cooperation with the Yugoslav firm, Progres Invest, F. L. Smidth is supplying the following major equipment: 825 tph crusher; circular prehomogenizing storage for limestone; 1,600 kW raw mill; 4.15×58m precalciner kiln with four-stage preheater and Folax cooler; two 4.4×12m Combidan cement mills; 4×5m Tirax coal mill; portal scraper storage; automatic control equipment. The new production line will add 2,200 tpd capacity.

RTH AMERICA

Canada

Cement production			Capacity	
1976	1977	1978	1979	1980
9.898	9.933	10.473	17.025	17.382

• Canada Cement Lafarge Ltd.: Expanding plant at Exshaw, Alberta, to add 600,000 tpy. Equipment includes: F. L. Smidth gas-fired 3.95×56m kiln, rated at 1,950 mtpd and equipped with a four-stage preheater with precalciner; Fuller 3.96×12.62m, 3,700 hp, two-compartment raw mill; F. L. Smidth 4.60×14.02m, 6,000 hp finish mill; Fuller clinker cooler; Wheelabrator electrostatic precipitator; Fuller-Kinyon conveying equipment. Operation was scheduled for 1980. Lafarge Consultants Ltd. are the engineering consultants for the expansion.

• Ciment Quebec, Inc.: St. Basile de Portneuf, Quebec. Plant expansion will replace existing 1,100 tpd wet process plant with a Fuller SF system rated at 2,000 tpd. Fuller Co. is furnishing major equipment, including: four-stage preheater with flash calciner; cooler; Fuller-Loesche airswept roller mill; blending equipment; Airslide conveying equipment; Fuller-Kinyon pumps; and dust collectors. Scheduled onstream in 1981.

• Federal White Cement Ltd.: Woodstock, Ontario. New 100,000 tpy white cement plant onstream in 1979. Lafarge Consultants Ltd. handled design, engineering, project management, site supervision, training of personnel, and start-up assistance.

• Inland Cement Industries Ltd. (Genstar Ltd. subsidiary): Edmonton, Alberta. Plant expansion was expected to start up in 1980. Equipment, furnished by Fuller Co., includes: four-stage preheater with flash calciner; 13½ ft.×190 ft. rotary kiln; clinker cooler; blending equipment; Airslide conveyors; Fuller-Kinyon conveying equipment. Technical and engineering services provided by Blue Circle Industries Ltd.

• St. Lawrence Cement Co.: Mississauga, Ontario. Expanded via a Fuller SF flash calciner to increase production from 3,000 to 4,500 mtpd. Added cooler section and new kiln drive. Scheduled onstream in 1980.

United States of America

Cement production			Capacity	
1976	1977	1978	1979	1980
65.248	67.973	72.471	91.5	95.

U.S. developments are covered elsewhere in this issue.

Quantities in million metric tons

CENTRAL AMERICA

Bahamas

Cement production			Capacity	
1976	1977	1978	1979	1980
.270	.070	.330	.520	.730

Barbados

• Governments of Barbados and Guyana have signed a contract with Holderbank Consulting Ltd. (Canada) for engineering and project management of plant to be built on Barbados Island. The plant is rated at 250,000 tpy and is scheduled for operation in 1980. Sixty percent of the clinker will be ground into cement in the Barbados plant; the other portion will be shipped to Guyana for grinding. In recent years, Barbados has imported 30,000-70,000 tpy of cement

Costa Rica

Cement production			Capacity	
1976	1977	1978	1979	1980
.362	.406	.426	.592	1.042

• Cementos del Pacifico (subsidiary of Corporacion de Desarrollo): New 1,300 mtpd cement plant onstream in 1980 in the province of Guanacaste (75 miles west of San Jose). Allis-Chalmers and Ateinsa (Spain) provided equipment and technical services. The contract included an Allis-Chalmers roller mill with 1,750 hp drive motor; suspension preheater; 14 ft. × 197 ft. rotary kiln; 8 ft. × 22 ft. inclined/10 ft. × 41 ft. horizontal stoker cooler; 13 ft. × 42 ft. finish grinding Compeb mill with a 4,000 hp motor. Asland S.A. (Spain) is providing staff training and start-up assistance.

Cuba

Cement production			Capacity	
1976	1977	1978	1979	1980
2.501	2.600	2.712	3.39	4.89

• Desarrollo Industrial: Rene Arcay Cement works: Mariel. Expansion, scheduled for 1980 operation, was to double capacity to 4,400 tpd. Humboldt Wedag has furnished a two-shaft hammer crusher rated at 900 tph limestone. Engineering was provided by KHD Industrieanlagen AG in cooperation with Centunion (Madrid). In addition, a ship-loading installation is being built.

Dominican Republic

Cement production			Capacity	
1976	1977	1978	1979	1980
.842	.863	.873	1.411	1.421

El Salvador

Cement production			Capacity	
1976	1977	1978	1979	1980
.322	.334	.9	.614	.964

• Cemento de El Salvador S.A.: Dry process system expansion at El Ronco, Metapan plant onstream in 1979. Major equipment for this 1,000 mtpd addition, furnished by Allis-Chalmers, includes: 13½ ft. × 209 ft. × 273 ft. rotary kiln; 177 ft high, four-stage preheater; satellite cooler consisting of nine 5½ ft. × 50 ft. tubes; 13 ft. × 22 ft. diaphragm ball mill; 12 ft. × 36 ft. Compeb-type finish mill.

Guadeloupe

Cement production			Capacity	
1976	1977	1978	1979	1980
.131	.133	.162	.250	.250

Guatemala

Cement production			Capacity	
1976	1977	1978	1979	1980
.445	.489	.540	.840	.840

• Cementos Progreso S.A.: Expanding San Miguel plant with a 1,600 mtpd clinker production line. Start-up was scheduled for 1979. F. L. Smidth supplied the major equipment, including: 4.55m-diameter × 68 × 90m-long kiln; four-state suspension preheater; 165 mtph raw mill; 85 mtph raw mill; 10 planetary cooler tubes; electrostatic precipitator; storage, material handling, and shipping equipment. Bendy Engineering Co. performed engineering work.

Haiti

Cement production			Capacity	
1976	1977	1978	1979	1980
.246	.266	.249	.300	.330

• Lafarge Consultants Ltd., Montreal, has signed a contract with the Department du Commerce et de l'Industrie of the Republic of Haiti to complete the preparation for the construction of a new cement plant in Gonaives, Haiti.

Honduras

Cement production			Capacity	
1976	1977	1978	1979	1980
.254	.250	.271	.621	.636

• Industria Cementera Hondurena, S.A.: Piedras Azules (north central Honduras). New plant under construction in 1979 for production of 1,200 metric tons per day of clinker plus more than 500,000 mtpy of portland and pozzolanic cement. Scheduled onstream in 1981. Kawasaki-Itoh is furnishing main equipment, including: Kawasaki-Hazemag 300 mtpd crusher; 4.4 × 9m raw mill; 1,200 mtpd kiln with four-stage preheater and satellite cooler; and 46 mtpd finish mill.

• Cementos de Honduras, S.A.: Expanding its Rio Bijao plant near the town of San Pedro Sula with a 2,000 tpd production line. Order was awarded to F. L. Smidth and includes: two circular storage sections for limestone homogenizing; a raw grinding plant with a 3,000 kW Duodan mill; a 4.55 × 68m, 2,000 tpd kiln with four-stage preheater and riser pipe calcining; a Unax cooler. Holderbank Consulting Ltd., Ontario, Canada, handled studies, conceptual work, procurement of equipment, and basic design.

Jamaica

Cement production			Capacity	
1976	1977	1978	1979	1980
.365	.333	.294	.425	.425

• Caribbean Cement Co. Ltd.: Expanding its Kingston plant with a 1,300 mtpd installation. Major equipment being supplied by Allis-Chalmers includes: a 14 ft. × 197 ft. rotary kiln with a suspension preheater; a cooler with an 8 ft. × 22 ft. inclined section and a 10 ft. × 42 ft. horizontal section; and a roller mill.

Martinique

Cement production			Capacity	
1976	1977	1978	1979	1980
.119	.129	.131	.250	.250

Mexico

Cement production			Capacity	
1976	1977	1978	1979	1980
12.584	13.277	15.285	16.938	19.493

• Cemento Portland Nacional S.A. (Empresas Tolteca de Mexico,

S.A. group): Hermosillo, Sonora (plant is about 25 km from Hermosillo). New 1 million tpy plant scheduled to go onstream in 1982. F. L. Smidth will supply major equipment and also will erect and commission the plant. Engineering is being done by Blue Circle Industries which has a 49% share in the company. The main FLS equipment consists of a 4.35m-diameter × 66m kiln with single-string, four-stage preheater and precalciner; Folax grate cooler; two 4.8m-diameter × 8.57m-long raw mills with 1800 B Symetro gears; two 4.8m × 12.5m-long cement mills with 2020 BC Symetro gears—all are arranged for closed-circuit grinding, crushing, and homogenizing. Smidth also will supply dedusting equipment and all auxiliary and electrical equipment, including instrumentation and control.

• Cimentos de Chihuahua, S.A.: Chihuahua, Chih. Expanding plant by a 1,700 mtpd clinker line. Scheduled onstream in late 1981. Main machinery to be supplied by F. L. Smidth includes: 4.8 × 9m Duodan mill with central Symetro drive; homogenizing system; four-stage preheater; 4.55 × 68m kiln equipped with Unax planetary cooler. Sereland (Spain) is in charge of design, equipment procurement, and supervision of the expansion.

• Cooperativa Manufacturera de Cemento Portland "La Cruz Azul," S.C.L.: Cruz Azul, Hidalgo. Plant expansion start-up in 1979. Fuller Co. equipment supplied includes: 17 ft. × 270 ft. rotary kiln with four-stage twin preheater; clinker cooler; and blending equipment.

• Cooperativa Manufacturera de Cemento Portland "La Cruz Azul": Lagunas, Oaxaca. Expanding Lagunas plant capacity from 3,600 tpd to a total of 5,000 tpd. Krupp Polysius is furnishing major equipment including: Dopol kiln with a 3,600 tpd Prepol precalciner and a 4,200-tpd grate cooler.

• Cementos Mexicanos S.A.: Valles, Est. San Luis Potosi. In the autumn of 1978, Cementos Mexicanos S.A. placed an order with F. L. Smidth for the main machinery for a 2,200 tpd expansion of their Valles plant. The equipment includes a 4.15 × 58m precalciner kiln with type 824S Folax cooler, a 4.6 × 7.6m, 2,200 kW raw mill, and a 4.6 × 14m, 4,400 kW cement mill, both with Symetros.

Costa Rica: Cementos del Pacifico placed its new 1300 tpd plant onstream in 1980 in the province of Guanacaste. Pyroprocessing equipment includes a MIAG 4-stage heat exchanger and an Allis-Chalmers 14′ × 197′ rotary kiln. *(Courtesy: Asland S.A., Spain)*

• Cementos Mexicanos S.A.: Monterrey, Est. Nuevo Leon. At the beginning of 1979, Cementos Mexicanos S.A. followed up their Valles expansion project with a similar extension of their Monterrey plant. The new kiln and associated raw mill and cement mill will be identical to the F. L. Smidth Valles equipment. Holderbank Consulting Ltd., Ontario, carried out basic conceptual work, equipment procurement, drawings, and process control engineering.

• Cementos Mexicanos S.A.: Torreon, Est. Coahuila: Cementos Mexicanos S.A. put the third kiln in their Torreon plant into operation in August 1979. F. L. Smidth supplied a 4.55 × 68m kiln with four-stage preheater, Unax cooler, and TUM 4.6 × 7.6m raw mill with Symetro gear. A new 2,200 tpd production line will be supplied by F. L. Smidth.

• Cementos Guadalajara S.A. put a new production line into operation at their Ensenada, Baja, Calif. plant during October 1979. The equipment comprises a four-stage preheater kiln with Unax planetary cooler, a TUM 4.6 × 7.6m, 2,200 kW raw mill and a UM 3.8 × 11.2m, 2,200 kW cement mill, both with Symetros. The main machinery was supplied by F. L. Smidth.

• Cementos Apasco S.A. has placed an order with F. L. Smidth for equipment for a new 2,200 tpd cement plant at Macuspana in the state of Tabasco. The order includes a 4.15 × 58m rotary kiln, a Tirax mill, and a Unidan mill. Operation was scheduled for 1980.

• Cementos Vera Cruz S.A. (Empresas Tolteca de Mexico, S.A. group): Orizaba, Vera Cruz. Expansion slated for mid-1981 operation. Installing one Polysius Prepol preheater with precalciner/kiln, rated at 2,400 tpd. Holderbank Consulting Ltd., Ontario, carried out engineering, design studies, and equipment procurement.

• Cementos Tolteca S.A.: Zapotiltic. Expansion of 2,500 mtpd. Main equipment by F. L. Smidth includes: two Tirax-Unidan 5.6 × 8.25m raw mills, 4,500 kW each; silo blending system; four-stage preheater with firing in riser pipe; 4.75 × 75m rotary kiln with Unax planetary cooler. This is a Blue Circle project.

Nicaragua

Cement production			Capacity	
1976	1977	1978	1979	1980
.226	.226	.199	.340	.350

Panama

Cement production			Capacity	
1976	1977	1978	1979	1980
.282	.270	.300	.510	.565

Trinidad and Tobago

Cement production			Capacity	
1976	1977	1978	1979	1980
.238	.215	.220	.224	.224

• Trinidad Cement Ltd.: Claxton Bay, Trinidad. Expansion to add 300,000 tpy capacity.

Quantities in million metric tons

SOUTH AMERICA

Argentina

Cement production			Capacity	
1976	1977	1978	1979	1980
5,712	6.002	6.316	8.776	11.061

• Juan Minetti S.A.: New 540,000 mtpy plant was scheduled for operation in 1980. Major equipment supplied by KHD Humboldt Wedag and cooperating partner Centunion (Spain) will include: 4.4×64m rotary kiln; 4×13m, 2,790 kW clinker grinding mill rated at 100 tph.

• Loma Negra Compania Industrial Argentina, S.A.—Olivarria: Expansion, onstream in 1980, includes: modification of existing long, dry kiln to two-stage preheater unit; capacity increase from 1,200 mtpd to 1,600 mtpd; modification of existing Polysius preheater to precalcining; capacity increase from 2,400 to 3,500 mtpd; one 4,000 hp cement mill, 4.2×14m, rated for 80 mtph at 2900 Blaine.

• Cemento Noroeste: La Rioja province. Projected new plant with a capacity of 350,000 mtpy.

• Corp. Cementera Argentina S.A.: Capdeville plant Expansion incorporating F. L. Smidth 2,000 tpd kiln with a four-stage cyclone preheater and a Folax grate cooler. Scheduled operation: 1980.

• Corp. Cementera Argentina S.A.: Yocsina plant. Adding F. L. Smidth four-stage cyclone preheater.

• Calera Avellaneda S.A.: Olavarria. Converted second production line to the KHD Humboldt Wedag Pyroclon process for raw meal precalcining. Modification raises clinker production rate of that line from 1,000 mtpd to 1,500 mtpd. Scheduled onstream in 1980.

• Cementera Santa Cruz: New .636 million tpy plant will be built by Spanish firm, Ateinsa, in Santa Cruz province. Site is on the Deseado River, near Pico Truncado. Calcite will be used from Cementera's nearby quarry. Scheduled onstream in 1983.

• Cementos Noa: Juramento, province of Salta. Constructing new 650,000 tpy plant. Asland S.A. has technical responsibility for the project and plant. Buhler-Miag and Ateinsa providing major equipment including: limestone crusher; clay crusher; Miag 3,800 kW raw mill; 4.6×70m kiln with four-stage preheater; 3,800 kW cement mill; bagging plant. Scheduled onstream: end of 1982.

Bolivia

Cement production			Capacity	
1976	1977	1978	1979	1980
.220	.153	.170	.328	.525

• Fabrica Nacional de Cemento S.A.: Cal Orcke plant expansion via one 200,000 tpy dry process kiln.

• Sociedad Boliviana de Cemento S.A.: Viacha plant expansion via a 500 tpd F. L. Smidth dry process kiln, onstream in 1979.

• Lafarge Consultoria e Estudios, subsidiary of Lafarge Conseils et Etudes (Lafarge Group) for Latin America, has been awarded a consulting engineering contract in Bolivia for the construction of the new Yacuces cement plant in the province of Chiquitos, department of Santa Cruz. The contract was awarded by the Corporacion Regional de Desarrollo (Regional Development Agency) of Santa Cruz. The new dry process plant will have an annual clinker production capacity of 335,000 tons, and the kiln will be equipped with a cyclone preheater. Start-up is scheduled for 1983.

Brazil

Cement production			Capacity	
1976	1977	1978	1979	1980
19.147	21.123	23.203	27.	30.

• Cimento Maua, S.A. (Companhia Nacional de Cimento Portland), Cantagalo, state of Rio de Janeiro. New plant, scheduled onstream in 1981, has been designed for a 700,000 mtpy production. Equipment, to be supplied by a consortium of F. L. Smidth and Christiani-Nielsen, will include a 3.95×56m precalciner kiln with Folax grate cooler; a 5.2×9.75m raw mill; and a 3.8×12m cement mill. CNCP and Lafarge Consultoria e Estudio (Brazil) are the consulting engineers on the project.

• Camargo Correa Industrial S.A.: Expanding Apiai, Sao Paulo plant with a 3,500 tpd precalciner-preheater kiln addition. Expansion will also include crushing, grinding, material handling, and shipping equipment. Engineering design to be provided by Bendy Engineering Co.

• Cimento Itau do Parana S.A.: Rio Branco do Sul, Parana plant, doubled capacity with 1,000 tpd production line. F. L. Smidth supplied equipment including: 4.15×60m kiln with four-stage preheater and Unax planetary cooler; 4×7m raw mill; 4×12m cement mill. Onstream in 1980.

• Cia de Cimento Portland Gaucho: Pinheiro Machado, Rio Grande do Sul plant expansion via one 200,000 tpy dry process kiln. Was scheduled onstream in 1979.

• Cia de Cimento Portland Poty: Sao Jose Paulista. Pernambuco plant expansion via one 2,000 tpd dry process kiln. Scheduled operation: 1980.

• Cia Materiais Sulfurosos-Matsulfur: Montes Claros, Minas Gerais plant expansion via a F. L. Smidth 2,000 tpd dry process kiln. Scheduled operation: 1979.

• Cimento Tocantins S.A.: Sobradinho plant expansion planned via a 1,000 tpd dry process kiln.

• Cimenvale—Mineracao e Cimento Vale do Itajai S.A.: New plant at Brusque, Santa Catarina, under construction.

• Ciminas—Cimento Nacional de Minas S.A.: Doubling of present capacity of Pedro Leopoldo plant under consideration.

• Cia Agro-Industrial de Monte Alegre: New plant with one wet process 1,000 tpd kiln was due onstream in 1979.

• Cia Cearense de Cimento Portland: Sobral, Ceara plant expansion with one F. L. Smidth 1,000 tpd dry process kiln. Onstream in 1980.

• Cia de Cimento Portland Goias: Palmeiras De Goias. Onstream in 1980. One Polysius precalciner kiln rated at 880 tpd.

• Cia de Cimento Portland de Sergipe: New plant with one 1,000 tpd dry process kiln at Laranjeiras, Sergipe. Was scheduled onstream in 1979.

• Cimento Santa Rita: Itapevi cement works. Increasing capacity of No. 4 kiln line from present 800 mtpd to 1,350 mtpd by addition of Humboldt Wedag Pyroclon system for precalcination of raw meal. Equipment and installation to be provided by a consortium of KHD Humboldt Wedag and Zanini of Brazil.

• Cimento Tupi S.A.: Pedra do Sino and Volta Redonda Cement Works. A consortium, Zanini Equipamentoes Pesados S.A./ Humboldt Wedag Div. of Otto Deutz S.A. Motores e Tratores, is supplying equipment for expansion of both plants. At Pedra do Sino (about 400 km west of Rio de Janeiro), the production of a cement clinker line is being increased from a previous 1,800 metric tons to 2,550 metric tons per day via the Humboldt Wedag Pyroclon process. In Volta Redonda (about 150 km southwest of Rio), where blast furnace slag is produced, a drying plant for slag and another grinding plant are under construction.

• Cimento Portland Asland do Parana—Planning construction of 1.4 million tpy plant in the state of Parana. Technical assistance from Asland do Brazil.

• Cia. Cimento Portland Itau: Itau de Minas (Minas Gerais) plant extension. F. L. Smidth supplying: 4×7m raw mill; 4.55 ×68m Unax kiln; two 4.4×13m cement mills.

• Cia. de Cimento Portland Rio Branco: Curitiba (Parana) plant. Adding two new production lines, each rated at 2,200 tpd. F. L. Smidth will supply major equipment, including: 5×8.5m raw mill; 5×80m Unax kiln; two 4× 12m cement mills.

• S.A. Industrias Votorantim: Salto de Pirapora, state of Sao Paulo. New 2,500 tpd plant to be built. F. L. Smidth will supply major equipment, including: 5× 10.75m raw mill; 5×80m Unax kiln; two 4.2×13m cement mills.

Quantities in million metric tons

Ecuador: Empresa Cementos Selva Alegre S.A.'s Otavalo plant is located 9,000 feet above sea level in the Ecuadorian Andes. Allis-Chalmers Canada furnished major equipment including a 14½' × 204' kiln equipped with 206' high preheater. *(Courtesy: Allis-Chalmers)*

Chile

Cement production			Capacity	
1976	1977	1978	1979	1980
.963	1.126	1.176	1.920	1.930

Colombia

Cement production			Capacity	
1976	1977	1978	1979	1980
3.622	3.430	4.140	5.630	5.780

• Acerias Paz del Rio: Setting up a 600,000 tpy slag cement plant at Belencito, province of Boyaca. Major equipment suppliers are Kawasaki Heavy Industries Ltd. and Marubeni Corp. Completion was scheduled for 1980.

• Fabrica de Cemento Samper, S.A. has awarded a contract to F. L. Smidth for the extension of its La Calera plant, 30 km from Bogota. The 1,500 tpd production line inclues a 1,500 tpd 5.×165m rotary kiln with two-stage cyclone preheater and Unax planetary cooler. Scheduled onstream in 1981.

• Cementos del Caribe, S.A.: Barranquilla. Expanding wet process plant with Allis-Chalmers 14 ft.×12.5 ft.×450 ft., 800 mtpd kiln and Allis-Chalmers 900 mtpd stoker-type cooler. Was scheduled for 1980 operation.

Ecuador

Cement production			Capacity	
1976	1977	1978	1979	1980
.608	.623	.834	1.099	1.389

• Empresa Cementos Selva Alegre S.A.: Building a 345,000 mtpy plant at Otavalo which was scheduled for start-up in 1980. Allis-Chalmers Canada Ltd. furnished major equipment including: 206 ft.-high preheater, 14½ ft.×204 ft. rotary kiln, stoker cooler, raw and finish grinding mills. SNC Inc. of Montreal served as the engineer/manager.

• La Cemento Nacional: Guayaquil. Expanding Cerro

Blanco plant. F. L. Smidth supplying the following major equipment for a 1,500 mtpd addition: 4.35×66m kiln equipped with a single-string, four-stage preheater; Folax grate cooler; 4.6×8.25m Tirax Unidan raw mill; Allis-Chalmers 13 ft.×45 ft. Compeb clinker grinding mill, 4200 hp; continuous silo blending system; dust collectors. Scheduled onstream in mid-1981. Holderbank Consulting Ltd. was the engineering consultant firm.

• Empresa Industrias Guapan S.A.: Azogues. New plant scheduled for 1981 start-up. Equipment, to be supplied by Fuller Co., includes one 13-1/2 ft.×190 ft. rotary kiln; 1,100 mtpd suspension preheater; 13 ft. diameter ×26 ft. Aerofall raw mill; 12 ft. diameter×37 ft., two-compartment finish mill; air-quenching grate cooler; blending silo aeration system; Airslide fluidizing gravity conveying systems; Fuller-Kinyon pumps; Plenum-Pulse dust collectors; central control console. Sereland (Spain) is providing consulting engineering and technical assistance.

Paraguay

Cement production			Capacity	
1976	1977	1978	1979	1980
.155	.200	.166	.200	.200

Peru

Cement production			Capacity	
1976	1977	1978	1979	1980
1.966	1.965	2.800	2.821	3.067

• Cementos Lima S.A.: 3,000 tpd expansion at Ataconga plant (near Lima) was scheduled onstream in 1979. Major equipment includes: precalciner kiln; 6,000 hp raw mill; 6,000 hp cement mill. Holderbank Consulting Ltd. (Canada) holds the engineering work contract.

• Cementos Norte Pacasmayo: Expanded Pacasmayo plant from 1,000 to 3,000 mtpd; completion was scheduled for 1979. Fuller Co. has equipment contract which includes: raw and finish open-circuit mills; 13 ft.×190 ft. rotary kiln; preheater with flash calciner; coolers; dust collectors; fluidizing conveyors; and blending equipment.

• Cemento Yura S.A.: Arequipa. Adding one 1,000 tpd dry process kiln. Fuller Co. supplied the following equipment: one 12 ft.×37 ft. raw mill; one blending system; one 12 ft.×37 ft. finish mill; five Plenum-Pulse dust collectors. Start-up was scheduled for 1980.

Surinam

Cement production			Capacity	
1976	1977	1978	1979	1980
.052	.047	.056	.065	.065

Uruguay

Cement production			Capacity	
1976	1977	1978	1979	1980
.678	.691	.686	.786	.786

• Administration Nacional de Combustibles Alcohol y Portland (ANCAP): Added 500 mtpd system to its existing 400 mtpd plant in Paysandu. Major equipment, supplied by Fuller-GATX (Pty) Ltd. of South Africa, includes: rotary kiln, four-stage preheater, clinker cooler, mills, blenders, pneumatic conveyors, and dust collection equipment. Start-up was scheduled for 1979.

Venezuela

Cement production			Capacity	
1976	1977	1978	1979	1980
3,475	3.408	4.150	7.187	8.387

• Cementos Caribe: Puerto Cumarebo (near Coro on northern coast of Venezuela). New 1 million mtpy plant onstream in 1979. Humboldt Wedag supplied major equipment including; Pyroclon precalcining suspension preheater; 17 ft.×270 ft. rotary kiln section; planetary cooler. Holderbank Consulting Ltd. (Canada) provided engineering and management work.

• Cementos Catatumbo: New 600,000 mtpy plant in state of Zulia onstream in 1980. Lafarge Consultants Ltd. (Canada) was consultant for design, procurement, project management, and start-up assistance. Creusot-Loire Entreprises supplied the major equipment, including preheater-equipped kiln. Plant is equipped with a four-stage preheater/precalciner rotary kiln, 145 tph raw mill, and 75 tph finish mill.

• Cemento Andino S.A.: Valera. In 1978, purchased following equipment from Polysius Corp.: precalcining system with 4.2×65m kiln rated for 1,800 mtpd; 4.4×10.5m raw mill rated for 138 mtph, with two 5.2m-diameter separators; 4×13.5m cement mill rated for 90 tph with two separators.

• C.A. Venezolana de Cementos: Pertigalete plant. Expansion in 1977 added one 800-tpd wet process kiln. Expansion scheduled for 1979 operation incorporated a 2,700 tpd dry process kiln.

• Consolidada de Cementos C.A.: Expansion at San Sebastian, Est. Aragua plant via one 2,400 tpd Allis-Chalmers dry process kiln. Scheduled onstream in 1982. ●

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Quantities in million metric tons

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